

EASTPORT HARBOR
MAINE

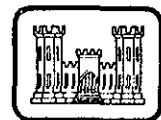
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**RECONNAISSANCE REPORT
FOR
NAVIGATION IMPROVEMENTS**

Department of the Army

New England Division, Corps of Engineers



SEPTEMBER 1979

SYLLABUS

This report was prepared in order to evaluate the technical, economic, and environmental feasibility of modifying the existing federal navigation project in Eastport, Maine.

During a severe coastal storm known as the "Groundhog Gale" of 2 February 1976, the downtown waterfront area and business district of Eastport sustained considerable damage. Several shore structures were badly damaged or destroyed, including Wadsworth's Dock which fell into the sea during the height of the storm. This dock previously afforded protection to the anchorage area and shoreline behind the breakwater during southeast storms. These areas are now vulnerable to wave attack and damage during southeast storms.

In light of this situation and at the request of local officials and interests three plans of improvement involving the construction of a breakwater with a protected anchorage behind it located along the Eastport Harbor waterfront south of the existing breakwater were considered.

It was felt those plans would provide for the existing and future needs of local interests by providing protection to the downtown business district from wave attack during storm conditions, by affording protection to the existing federal anchorage and by allowing for additional offloading of fish and other commercial cargo during storms.

The study findings indicate that none of the considered plans of improvement that were evaluated meet the economic criteria necessary for federal participation and cost sharing.

It is therefore recommended that the study be terminated at this stage due to the lack of economic justification for modification of the existing federal navigation project in Eastport Harbor, Maine.

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Eastport Harbor, Maine

SECTION I. Introduction

Being founded on an island and surrounded on all sides by the sea, it is not too difficult to understand that since its very inception the city of Eastport and its residents have relied heavily on the ocean to provide for a major portion of their needs. The ocean has been intensively used as a source of food, employment, recreation and enjoyment, as well as a means of transportation. Traditionally, the major forms of economic activity in Eastport have included fishing, fish processing, shipping and ship building. At the turn of the century, the name Eastport was often times synonymous with the sardine canning center of the world. Unfortunately, since that time, the economic activity associated with the fishing industry has experienced a gradual but steady decline. At the present time, the overall economy in general and the fishing industry in particular has been greatly reduced from what they were in earlier times.

The local officials and interest groups in Eastport are desirous of

upgrading the overall economic conditions in general and the fishing industry in particular. In order to accomplish this, it is the general consensus that the first thing needed is additional protection for the Eastport Harbor waterfront and the local fishing fleet from southeast storms. It is generally believed by local interests that unless some protection is provided in the form of a breakwater or a breakwater/pier type structure, complete destruction of a major portion of the downtown commercial district will occur and the existing commercial fishing fleet will continue to experience damage and sustain losses due to storm activity.

PURPOSE

This reconnaissance report is being prepared to determine the economic, technical and environmental feasibility of modifying the existing Federal navigation project at Eastport Harbor, Maine. In addition, if any type of modification is found to be justified, this report will establish the procedure for continuing the study in more detail. This report can also be used as a management tool to assist in the direction and coordination of further investigations if they are found to be warranted.

AUTHORITY

During a severe coastal storm known as the "Groundhog Gale" of 2 February 1976, the downtown waterfront area and business district of Eastport sustained a considerable amount of damage. Several shore

structures were badly damaged or destroyed, including Wadsworth's Dock which fell into the sea during the height of the storm. Wadsworth's Dock was located a little south of the existing Federal breakwater and anchorage and previously afforded protection to the anchorage area and shoreline behind the breakwater during southeast storms. As a result of the damage sustained during this storm and the fact that a major portion of the waterfront in the downtown business district and the existing Federal anchorage are now almost totally unprotected from southeast storms, local interests approached their Congressional delegates to get a resolution passed to have the problem studied. Recognizing the seriousness of the problem, the Committee on Public Works of the United States House of Representatives adopted a resolution on 23 September 1976 authorizing a study to determine the advisability of making modifications to the existing Federal project. The resolution reads as follows:

"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE HOUSE OF REPRESENTATIVES, UNITED STATES, That the Board of Engineers for Rivers and Harbors, created under Section 3 of the River and Harbor Act, approved June 13, 1902, be, and is hereby requested to review the report of the Chief of Engineers, on Eastport Harbor, Maine, transmitted to Congress on May 6, 1960, with a view to determining whether further modification of the recommendations contained therein with respect to improvements of the harbor is advisable at this time."

SCOPE

It is the general consensus of local officials and interest groups that the best way to meet their present and future needs is by the construction of an additional breakwater/pier type structure located south of the existing breakwater. This structure would provide protection to the shorefront from wave attack during storms, afford protection to the existing anchorage, and allow for additional offloading of fish and other commercial cargo under storm conditions. In response to the desires and views of local interests, this study will evaluate the economic, technical, and environmental feasibility of constructing a breakwater/pier type structure along the Eastport Harbor waterfront in the interest of navigation and shore protection. Preliminary investigations during the course of the study will explore the present and future needs of the community based on economic, environmental, cultural, and sociological considerations. These investigations will be made to determine whether there is a need for conducting a full scale feasibility study and environmental investigation.

PRIOR STUDIES AND REPORTS

There have been two prior Congressionally authorized reports on Eastport Harbor. The first report was an unpublished survey report submitted to Congress on May 25, 1937. The report was unfavorable to the construction of a stone filled wooden crib breakwater extending from the waterfront at Eastport and designed to provide a protected anchorage area. Benefits accruing to the then existing

commerce at Eastport were found to be inadequate to justify the relatively high construction cost of the desired breakwater, particularly inasmuch as the breakwater that was found to be most nearly justifiable economically was in a location then unacceptable to local interests.

The second report was a survey report that was transmitted to Congress on May 6, 1960 and is the report currently under review. The report was favorable to the construction of a sheet steel cellular breakwater with a top elevation of 26 feet above mean low water (MLW) and 500 feet long located parallel to the waterfront between the Holmes Wharf and the former Wadsworth Dock, and an anchorage area of 1.4 acres behind the breakwater with a depth of 14 feet in the southern 230 feet and 10 feet in the northern 250 feet. Local interests agreed to provide a public landing extending from shore to the breakwater and all fenders, berths, and mooring facilities. Prior to actual construction of the breakwater, a conference on Harbor Design was held at the office of the Chief of Engineers in December 1960. As a result of this meeting, it was determined that instead of extending the north end of the breakwater in a straight line approximately 50 feet beyond its intersection with the Public Landing as outlined in the Project Document, the breakwater would serve more effectively by turning this end toward shore to afford more protection to the anchorage areas from northeasterly storms. In addition, the type of breakwater was

changed from a cellular steel sheet pile construction filled with sand and gravel to a double row of steel sheet piling fastened with steel channel wales and tie rods and filled with quarry-run stone. Construction of the existing project was completed in August 1963.

COORDINATION

Past studies in the Eastport Harbor area have relied heavily on coordination with and input from private industry as well as from Federal, state, and local agencies and interests. The community of Eastport has always been a close knit one and the local officials and interests are continually striving to upgrade and improve the overall conditions in the community. The present study was initiated at the request of local officials after the so-called "Groundhog Gale" of 2 February 1976 caused a great deal of damage to the Eastport Harbor waterfront. Since initiation of the study in December 1977, a workshop meeting was held in Eastport on 25 January 1978 between the Corps of Engineers and local interests. The meeting was attended by members of the Eastport Economic Development Committee, Eastport Port Authority, Eastport City Council and the city manager of Eastport. The purpose of the meeting was to discuss the methods of developing benefits needed for economic justification of a Federal project and to solicit their assistance in preparing a report documenting the potential benefits they felt would be derived if a second breakwater/pier type structure was constructed along the Eastport waterfront. With the assistance of Mr. Richard Burgess,

who was then working for Eastern Maine Development District, an economic report was prepared by the community evaluating the potential benefits they felt would be derived if a second breakwater/pier type structure was constructed along the Eastport waterfront and was presented to the Corps in the latter part of September 1978.

After a thorough review of this report had been completed by the Corps, a second workshop meeting was held in Eastport on 14 December 1978 between representatives of the Corps and local officials and interests. The meeting was held to discuss the economic report prepared by the community and to formulate the exact type, location and extent of the breakwater/pier type structure they felt would meet their existing and future needs. In addition, coordination has also been ongoing with the U.S. Fish and Wildlife Service, Concord Area Office, state agencies and private industry during the course of the study. A copy of all pertinent correspondence related to the study effort is included in the Appendix.

SECTION II. Base Conditions

The intent of this section is to familiarize the readers with the existing environmental, cultural, economic, and sociological conditions prevailing in the study area. This section also offers some insight into the significant changes in these items that may be

expected to occur in the future assuming that a Federal improvement project is undertaken. By making a comparison between these two conditions an analysis can be made of the probable impacts that would be directly attributable to the proposed improvements.

ENVIRONMENTAL CONDITIONS

1. Setting

Eastport Harbor is located on the east side of Moose Island, Maine, and on Friar Roads, an international boundary passage between Moose Island and Campobello Island, New Brunswick. The harbor lies about 3 miles north of Lubec, Maine and about 40 miles east-northeast of Machias, Maine. Eastport is the most easterly city in the United States.

Friar Roads is a rectangular body of water extending about two miles north and south, and about one mile from Campobello Island on the east to Moose Island on the west, with deep water throughout the entire area except along the Eastport waterfront itself. It has two entrances from the sea, one north and one south of Campobello Island. The north entrance is through Head Harbor Passage, a straight natural channel in Canadian waters, 2,000 feet wide and 90 feet or more deep between Campobello Island and Deer Island. The south entrance is through Quoddy Roads and Lubec Narrows, international boundary waters, which have a dredged channel providing a depth of 12 feet at mean low water with a width of 500

feet. Anchorage is available off the city in Friar Roads itself.

The harbor itself is partially protected by an L-shaped breakwater which is parallel to the central waterfront for a distance of 485 feet with its north end turned at a right angle to the shore.

Behind the breakwater, an anchorage area of 1.4 acres has been dredged with depths of 10 feet in the northern section and 14 feet in the southern section. This existing Federal project was completed in August 1963. The mean tide range at Eastport is 18.2 feet and the spring range is 20.7 feet. The harbor is ice free all year-round. Tidal currents in Friar Roads have an average peak velocity of 3 knots.

2. Climatology

Eastport Harbor is exposed to winds from the north through the northeast, and to winds from the south. In the winter months, the Eastport Region lies between an Icelandic low pressure area and a moderate North American continental high pressure area, resulting in prevailing west-to-north winds. During spring and summer months, the Azores-Bermuda high intensifies and expands over much of the Atlantic Ocean. By late summer, this high pressure system shifts northward resulting in southwesterly prevailing winds through August and September. Although partially protected to the east and southeast by Campobello Island, it is exposed to limited fetches of wind from these directions. Storms of maximum velocity are from the

east and northeast.

3. Sediment Analysis

In 1972 six samples were taken from the Federal anchorage within the confines of the Federal breakwater and a sediment analysis was performed on all of the samples. The following sediment sample test results shown in Table 1 are mean values. These samples show a relatively low percentage of fines with the exception of two samples which contain over sixty percent fines. These two cases were somewhat higher than the average because the sample sites were located in an interior area where tidal flushing would be minimal. Consequently, visual classification showed organics, silts, and clays to be present in the several samples taken. However, these results are not indicative of the bottom material found throughout this area. For the most part, the sea bottom off Eastport is fairly gravelly and scoured due to intense tidal action.

TABLE 1
SEDIMENT SAMPLE TEST RESULTS

	Mean <u>(Average Value)</u>
% Volatile Solids - EPA	10.37
% Volatile Solids - NED	9.53
PPM Chemical Oxygen Demand	145,300.00
PPM Total Kjeldahl Nitrogen	2,516.66
PPM Oil and Grease	6,473.33
PPM Mercury	1.45

PPM Lead	245.75
PPM Zinc	353.08
PPM Arsenic	31.48
PPM Cadmium	1.96
PPM Chromium	34.73
PPM Copper	179.78
PPM Nickel	31.56
PPM Vanadium	56.58
PPB DDT	100.00
PPB PCB	2,000.00

4. FISHERIES RESOURCES

Eastport was once a major fishing and fish processing center, and up until 1957 eleven sardine canneries, two pet food plants, six smoke houses, and nine fish meal plants operated in the city. However, starting about 1963, the herring landings in the Quoddy region began a decline which was later experienced throughout Maine. Currently, at least 75 percent of the herring processed in Eastport is imported from Canada. As a result of this dramatic decrease in landings, the number of sardine canneries also decreased from eleven to one at the present time.

The Maine lobster is not an important resource in the Eastport region. Records listing lobster licenses issued to Eastport residents clearly show that lobster fishing has never been a major industry. The Eastport region has always been low in lobster

production, however, a large percentage of those caught are quite large. Low production in this area could be the result of predation, siltation, turbulence, scour, poor food supply, poor larval survival, or the extreme tidal range. No lobster pounds or buying stations are maintained in the Eastport area.

Although herring is the major commercial fish species landed at Eastport, small seasonal fisheries also exist for cod, pollock, and scallops. Landings of sea scallops in the Eastport area have increased steadily in recent years, possibly as a result of the decline in herring populations. These scalloping areas will need to be considered during disposal site selection in the next stage of the study.

According to local officials, no trawling or scallop dragging is done in the project area, thus the proposed project will not interfere with local fishing operations. As far as the local authorities could say, the only marine organisms inhabiting this area in great numbers are sea urchins and mussels. In addition, various species of starfish, sea anemones, and other invertebrates generally known to live in deeper water are probably located in the area.

The U.S. Fish & Wildlife Service has recommended close coordination with the National Marine Fisheries Service due to potential impacts

to a near shore redfish habitat. Eastport Harbor has been proposed as a marine sanctuary by NMFS under the Maine Sanctuaries Act due to the unique redfish situation. This item will need to be looked at in detail in the next stage of the study effort.

5. ENVIRONMENTAL IMPACTS

The construction of the proposed breakwater structure at Eastport will cause both short-term and long-term impacts to the surrounding environment. Short-term impacts include the destruction of benthic organisms at the proposed construction site as well as a temporary increase in turbidity due to construction activities. Long-term impacts include effects on the water quality within the confines of the proposed structure. The retention of organic sediment could have detrimental effects on the water quality of the area.

Precautionary measures must be taken in order to prevent any decrease in tidal flushing. As a result of this, consideration has been given to putting a gate in the breakwater access structure in order to maximize tidal flushing. Other long-term effects may include impacts on the cultural, economic, recreational, and aesthetic resources of the general project area. A proper evaluation of environmental effects cannot be fully determined until the final size and location of the breakwater structure is decided.

In addition to construction of the proposed breakwaters the dredging of a one acre anchorage behind them involving the removal and

disposal of from 5,000 to 10,000 cubic yards of ordinary material will also have both long and short-term impacts on the marine environment. During the dredging operation turbidity in the water column will increase thereby reducing the amount of sunlight penetrating the water in turn reducing the rate of photosynthesis in marine flora and certain members of the plankton community. All benthic organisms in the immediate area of activity would be destroyed. Exposure of underlying bottom sediments could result in chemical reactions within the water column depending on sediment content. Possible effects could include lowering the oxygen level, suspension of heavy metals, formation of hydrogen sulfide and release of toxic metals.

Due to the preliminary nature of the study a specific disposal site has not been selected. During this early stage of the study it has been assumed that the dredged material will be disposed of in deep water relatively near the project site. The disposal site will be subject to similar impacts as those occurring at the project site. In addition, the biological community inhabiting the disposal area could be completely destroyed or altered depending on the nature of the dredged material and the bottom material at the disposal site.

A thorough evaluation of the effects of dredging and disposal of the dredged material on the environment will be made later in the study when a specific project and disposal site has been selected.

ECONOMIC, CULTURAL, AND SOCIOLOGICAL CONDITIONS

To a large degree the resources of a region determine the status of its economic well-being and growth potential. A general understanding of these resources and developmental trends in the area is helpful in identifying regional problems and needs and selecting appropriate solutions. The following paragraphs contain a discussion of the resources in the study region.

1. Population

Prior to 1970 the population of Eastport and Washington County had been experiencing a steady decline. The decrease in population is directly related to the gradual decline in the traditional forms of economic activity - fishing, fish processing, shipping, and shipbuilding.

Recently, however, this trend appears to be changing. An increase in population was experienced between 1970 and 1973. This increase is attributed to the influx of: (a) elderly retired couples; (b) returning home residents; and (c) urban dwellers seeking new life styles.

The following table shows the long decline and recent increase in population for Eastport and Washington County.

TABLE 2
Population Figures for Selected
Years From 1900-1973

	<u>Eastport</u>	<u>Washington Co.</u>
1900	5,311	45,232
1950	3,123	35,187
1960	2,537	32,908
1970	1,989	29,859
1973	2,103	31,737
% change '70-'73	+5.7%	6.3%

Source: Washington Co. Regional Planning Commission, 1976

During the period of declining population the youth of Eastport were leaving to seek employment elsewhere in order to obtain higher income jobs. Part of the recent increase in population is directly attributable to the return of young people. Many experts predict this trend towards rural living will dominate the 1980's, and if it does, the population of Eastport should continue to rise.

The following table gives both past and future population figures for the period 1970 through 1982.

TABLE 3

Past and Future Population Figures 1970-1982

	<u>Eastport</u>	<u>Washington Co.</u>
1970	1,989	28,859
1975	2,020	32,854
1977	2,140	33,600
1980	2,210	35,200
1982	2,250	36,200
% change '70-'82	+13.1%	+21.3%

Source: Comprehensive Development Plan and Action Program

Townscape Associates

An analysis of age groups also reveals some important changes which are underway. The 1970 figures show Eastport had a lower percentage of children and young adults and a higher percentage of middle-aged and elderly people when compared with the county as a whole. This composition of the population is changing. The year 1970-1974 show a marked increase in the percentage of children and young adults, and a corresponding decline in the percentage of middle-aged and elderly people.

2. Housing

The majority of housing units in Eastport are single family frame houses that were built 50 or more years ago. Due to the past

decrease in population an ample supply of housing units exist. A vacancy rate of 3% is not uncommon. Also, many of the existing homes are in need of rehabilitation and repair. Since 1970 the total number of housing units has increased. From 1970 to 1977 the number of units increased by 3.2% to a total of 898.

The following table gives the 1978 statistics for various types of homes.

TABLE 4
HOUSING UNITS

<u>Types of Homes</u>	<u>Washington Co.</u>	<u>%</u>	<u>Eastport</u>	<u>%</u>
Single family	8,709	81	817	88
Mobile	1,060	10	52	6
Vacant	276	3	35	4
Other Units	<u>693</u>	<u>6</u>	<u>22</u>	<u>2</u>
	10,729	100	926	100

Along with the increase in housing units has come an increase in the number of occupied units. In 1970 there was a 20.4% vacancy rate which by 1975 had dropped to 2.2%.

The condition of housing units is still a major problem. The number of substandard units has declined since 1970 due to the loss of 11 such units, renovation of 9 substandard units and the completion of the 16 new rental units. The 16.6% rate of substandard units is

still a major problem.

Eastport housing needs include a program for the rehabilitation of older houses; continued program for the demolition of dilapidated older houses; some new houses, especially low cost housing for low-income families and the elderly; some new houses to provide enough vacancies to accommodate the expected growth in population; and an overall planning, funding, and financing program so that these needs can be met.

3. Economy and Employment

Eastport has been experiencing serious economic difficulties in recent years. Jobs and adequate income are major needs.

Unemployment and underemployment have been and still are serious problems. Unemployment in 1976 was approximately 12%, but it reached highs of 16-18% during the winter months. As of February 1979 the unemployment rate for Eastport was 24.9%. Jobs in the past have been heavily dependent on the fishing industry. The departure of 14 sardine canning factories has led to a serious impact on the economic base of the town and has greatly reduced sources of employment.

The main industries remaining in Eastport are the Mearl Corporation, a fish processing company; Guilford Industries, a large woolen mill; and Holmes Packing Co., the one remaining sardine factory.

Seasonality of employment remains a major problem with the fish processing and sardine packing industries. This condition contributes greatly to low incomes and high unemployment.

Another problem in the economy is that the decline in manufacturing has not been overturned by growth in other sectors. There exists a substantial exporting of local dollars. Bank officials estimate that citizens of Eastport spend as much as 90% of their wages in other towns. Because there is a shortage of good shops, stores and services in the city, people buy elsewhere and because they have grown accustomed to buying elsewhere, new local businesses are difficult to establish.

Recently, however, Eastport has been given hope that may lead to economic growth. A 250,000 barrel per day Oil Refinery and Marine Terminal has been proposed to be built by the Pittston Company of New York. This facility would have a major economic impact on the community in the form of tax revenues, jobs and related demands for goods and services. However, at the present time, the Pittston Company is having a difficult time obtaining a permit for the facility from the Environmental Protection Agency. The Environmental Protection Agency believes that air pollution, oil spills and development pressures resulting from the Pittston Company refinery at Eastport are "likely to jeopardize the continued existence of the bald eagle".

The attitude of the city council also appears to be shifting as seen by the fact that it is actively pushing for economic development. City officials are considering major waterfront improvements and the development of a major shipping related industrial park.

In 1978 the Washington County Marine Trades Center was relocated to Eastport. Assuming reasonable growth over the next decade the school, could well become an important stimulus to the local economy.

4. Land Use

Eastport's municipal boundaries encompass about 6,700 acres, only 2,300 of which are land.

The majority of Eastport's residents live in the city's center at the southeastern end of the island although a small group lives on the northwestern end in a section known as Quoddy Village.

Twenty-one percent of Eastport's developed area is residential land. The majority of residences are located in the urban section of the town. Commercial land occupies approximately 3 percent of the total acreage and is scattered throughout the area. Approximately 21% of the area is open space, the majority of which is forested.

Except for two industries, the town's business and industrial

districts are located along the waterfront on the edge of its residential area.

The following table presents land use in Eastport in 1970

TABLE 5
1970 LAND USE
EASTPORT

<u>Land Use</u>	<u>Acres</u>	<u>Percent Total City Area</u>	<u>Percent Total Devel- oped Area</u>
Single-Family Residential	185.23	2.77	21.03
Multi-Family Residential	0.10	-	0.01
Office-Service Business	2.16	0.03	0.25
Retail Business	21.45	0.32	2.44
Residential Business	2.32	0.03	0.26
Fishing-Oriented Industry	220.77	3.30	25.07
Other Industry	29.26	0.43	3.32
Warehouse and Storage	11.15	0.17	1.27
Public Facility	270.34	4.04	30.70
Semi-Public Facility	6.46	0.10	0.73
Streets and Roads	99.10	1.48	11.25
Railroad	32.29	0.48	3.67
Total Developed Area	880.63	13.15	100
Vacant, Agriculture and Open Space Land	1,409.37	21.04	
Water Areas	4,408.00	65.81	
Total City Area	6,698.00	100	

Source: R.W. Booker and Associates, Inc., A Comprehensive Development Plan, Eastport, Maine, 1970.

During the past several decades, the most significant changes in land use have been the closing down of most of the sardine factories, loss of piers and some buildings along Water St. and the loss of many old houses through fire and demolition and a modest

amount of new housing. Major new land uses include the new school, the new fire station and the Marine Trades Center.

5. Transportation

Transportation in Eastport and the surrounding area is limited. The only state road to Eastport is Route 190, a paved two lane highway. Route 190 is linked to the major regional highway, U.S. Route 1 at Perry, approximately six miles northwest of Eastport.

Eastport, with its deep water harbor, has the potential to become a major fishing port. Presently ship traffic in the Eastport area is primarily restricted to local fishermen.

Eastport has an airport that was constructed in the 1940's as a special national defense facility. It's two runways, 2,850 feet in length, are in poor condition. Use of the facility is limited. Lubec Municipal Airport with one 2,032 foot runway is in fair condition.

Because of Eastport's remote location industries which rely heavily on trucking will continue to discount Eastport as a possible location and the tourist industry will continue to play a minor part in the local economy. This means Eastport must look to water shipment as the only major form of transportation that can feasibly be encouraged and developed; and that can have a major positive

economic impact. To assist this development rail facilities are needed and the port resources must be developed. Industries relying on water transportation should be sought to take advantage of Eastport's harbor.

6. Public Facilities and Services

Eastport has two elementary schools with a total enrollment of 320 and one high school with an enrollment of 231. In 1977 a new elementary school was completed. The new school can accommodate grades K-8.

Located in Eastport is Eastport Memorial Hospital with a capacity of 26 beds. The other health facilities in the area include two hospitals one each in Calais and at Machias. These hospitals have a total capacity of 109 beds.

Eastport's water is supplied by a private utility. At the present time the community has no sewage treatment plant. Plans for such a plant are under investigation.

During 1977, recreational facilities in the form of tot parks, basketball and tennis courts were constructed. Also, an old fire station was transformed into a senior citizens center.

7. Future Development

The process of community redevelopment and economic revitalization has begun. Future development has been organized into 43 projects and programs divided into the following 8 categories:

- a. Town center/waterfront development
- b. Economic development
- c. Housing
- d. Community facilities
- e. Public works
- f. Transportation
- g. Natural resources conservation and development
- h. Historic preservation

Tentative future plans include extending the existing pier, construction of a breakwater, construction of an industrial park, increased tourism and reviving the fishing industry. Any future development should provide for an expanded tax base, employment and reasonable incomes.

There are two projects being considered for the Eastport area that could play a major part in future development. The first of these is the Pittston Refinery and Marine Terminal which was mentioned earlier and the second is the Cobscook Bay Tidal Power Project. Other important projects include rehabilitation of old houses, a youth center, senior citizen center(s), a medical facility and a new

high school.

The location of new development will be governed by two key land use themes: (1) clustering of development and (2) preservation of landscape variety. Suburban sprawl would not be to the city's advantage. Plans should be made now to control threats to landscape variety and natural resources.

It appears the declining economic trend of past years has been arrested and growth is now in an upward direction. The city's plan for development is very challenging, but with the city in the correct frame of mind and with the promising activity of recent years the future could be a prosperous one.

8. Waterway Improvements

The existing Federal project for Eastport Harbor, Maine is shown on Plate 1, at the end of this report. The existing project was adopted on 1/ July 1960 and a description of the project follows:

A breakwater 485 feet long, parallel to the central waterfront with its north end turned at right angles toward the shore, consisting of a double row of steel sheet piling, filled with quarry run stone; an anchorage basin of 1.4 acres behind the breakwater with depths of 10 and 14 feet below mean low water.

The existing project was completed in August 1963.

9. Waterborne Commerce

Table 6 presents a comparative statement of the waterborne commerce for the years 1967 through 1977. As can be seen from the table, during this time period, with the exception of a couple of years, the total tonnage has been gradually declining.

TABLE 6
COMPARATIVE STATEMENT OF COMMERCE

<u>YEAR</u>	<u>SHORT TONS</u>	<u>PERCENT INCREASE OR DECREASE</u>
1967	24,776	
1968	63,041	+154%
1969	28,318	- 55%
1970	18,157	- 36%
1971	11,534	-36%
1972	20,067	+ 74%
1973	13,777	- 31%
1974	18,605	+ 35%
1975	19,721	+ 6%
1976	16,385	- 17%
1977	11,826	- 28%

Table 7 gives a breakdown of waterborne commerce for the year 1977. The major waterborne commodities presently handled at Eastport include fresh fish (except shellfish), animals and products, salt, prepared animal feeds and prepared fish and shellfish. As can be

seen, fresh fish comprises most of the tonnage handled at Eastport.

TABLE 7

Waterborne Commerce - 1977

<u>Commodity</u>	<u>Short Tons</u>
Animals and Products, Nec	970
Fresh Fish, except Shellfish	9,380
Salt	790
Animal By-Products, Nec	1
Fish and Shellfish, Prepared	278
Prepared Animal Feeds	389
Miscellaneous Food Products	1
Basic Textile Products	2
Printed Matter	3
Machinery, except Electrical	5
Ships and Boats	4
Commodities, Nec	<u>3</u>
Total	11,826

SECTION III. Problems and Needs

This section of the report discusses the problems faced by commercial fishing vessels in Eastport and the shorefront erosion and damage occurring to waterfront facilities and structures during storms. In addition, the existing and future needs of the community

as they relate to navigation and shore protection will be addressed.

During the middle to late 1950's at the time the navigation study was being conducted that led to the construction of the existing Federal breakwater and anchorage the local interests expressed a need for a protected landing area along the Eastport waterfront where fish and general cargo could be handled in rough weather and a protected anchorage for a small number of fishing and other vessels.

At that time it was indicated by local interests that the highly exposed nature of the harbor, together with the frequency of relatively high winds, many times made it difficult or impossible to land fish or other cargo, with a consequent loss through delay. In addition, the lack of a protected anchorage along the waterfront made it necessary for fishing vessels to anchor at remote points with subsequent loss of time.

With the construction of the Federal breakwater and anchorage along the Eastport waterfront in the early 1960's it was felt that the immediate and future needs of the local interests would be provided for. However, since that time the Eastport waterfront south of the breakwater has continued to be buffeted by waves during southeast storms. This has caused a significant amount of erosion to occur along the shore in the area of the business district as well as causing severe damage to and destruction of several waterfront

buildings, piers, wharfs and docks. This storm damage has resulted in the abandonment of several buildings, and property owners have been hesitant to repair the damages or restore the facilities because of the continued threat of future storm damage.

During the so called "Groundhog Gale" of 2 February 1976, the Wadsworth Dock, located just south of the existing Federal breakwater and anchorage, was destroyed. This dock previously afforded protection to the anchorage during southeast storms. At the present time, the anchorage is unprotected against wave attack from the southeast quadrant. Once again, the community is faced with the lack of a protected anchorage and suitable facilities to offload during southeast storms.

At the present time, the local interests are anxious to obtain protection for the downtown waterfront area of Eastport and the existing Federal anchorage. They feel if the erosion is allowed to continue and the waterfront facilities and structures continue to be lost, the main street itself that parallels the waterfront will be undermined by wave action and a large portion of it may eventually be lost. This in turn would expose the commercial buildings on the opposite side of the street to flooding and wave attack. The economic losses associated with the loss of waterfront property and structures is having a crippling effect upon the local economy and tax base. If this situation is allowed to continue, the results

could be devastating.

The existing breakwater pier is used by the local fishing fleet for protection during storms and from icing conditions. However, under existing conditions only a limited number of vessels are able to utilize the shelter of the pier effectively. At the present time, the standard procedure is to moor the vessels side-by-side behind the breakwater. Using this method, the last two or three boats nearest the open end of the pier get buffeted by wind and waves and receive damage to planking, cabins and deck gear during southeast storms. The local fishermen have indicated that only ten or twelve boats can moor at the Eastport pier at one time for protection. As a consequence, the fishermen have indicated that a major portion of the local fleet receive damages on an annual basis due to storms and icing conditions. This continual battering sustained by the commercial fishing fleet in Eastport has caused its gradual decline. In order to ensure the well being of the existing fishing fleet in Eastport and to encourage its future expansion, it is imperative that the vessels be afforded additional protection.

The local officials and interests are considering a number of plans and measures they can take to improve the overall conditions in Eastport. One of the plans being considered is the reconstruction of a portion of the downtown commercial district, most of which has experienced storm damage. During the summer of 1978, a sum of money

was made available to the city of Eastport by the National Endowment of the Arts and Humanities to be matched by local funds of an equal amount for the purpose of developing plans for the reconstruction of the downtown commercial district. The plans developed to date call for the construction of a waterfront bulkhead, demolition of abandoned building, and the creation of sidewalks and green areas along its length. Estimates received from architectural and engineering firms indicate the cost to be around \$1,000,000 for the reconstruction. It is unlikely that funds would be raised or spent for the project by the community without some assurance that the area will be protected against wave attack and flooding during storms.

Another proposal being considered by local officials involves the construction of marina facilities at two locations along the waterfront in order to better accommodate the docking and mooring needs of the local recreational fleet. The city would be able to receive revenues from the fees that would be assessed on the users of the proposed facilities. Once again, before the community or a private investor would be willing to undertake the construction of a marina along the Eastport waterfront, provisions would have to be made to ensure that it would be adequately protected against wave attack during storms.

The local officials and economic interests are all in agreement that

the best way to provide the needed protection to the downtown waterfront area and fishing fleet is to construct an additional breakwater/pier type structure along the Eastport Harbor waterfront just south of the existing structure. They feel that such a structure will help prevent most of the erosion and damage now occurring along the Eastport waterfront and to the fishing vessels in the area. Once conditions in the area are stabilized, the feeling is that the proposed facility will provide the basis for revitalization of the fishing industry in and around the Eastport area, and become the focal point for new local commercial development and for the redevelopment of the whole waterfront area of the city. In addition, it is envisioned that construction of the new facility will spur new private capital development and will lend support to efforts to raise public funds for redevelopment purposes. Without the additional breakwater pier the feeling is that it will be very difficult to upgrade the existing conditions in Eastport.

SECTION IV. Considered Plans

of Improvement

The intent of this section of the report is to discuss and evaluate the various plans of improvement that were considered during the course of the study to meet the existing and future needs of the community of Eastport. Due to the preliminary nature of this stage of the study, the alternative plans of improvement have not been developed in great detail; rather, the plans have only been developed in enough detail to show justification for either proceeding on to the next detailed stage of the study or for terminating the study at this point.

In an effort to comply with the desires and needs of local interests for protection of the downtown business district, protection of the existing Federal anchorage and to upgrade the overall economy in Eastport; consideration was given to different variations of a breakwater/pier type structure to be constructed along the Eastport waterfront south of the existing structure. In addition the local interests requested that consideration be given to providing an additional sheltered anchorage and offloading area behind the new structure.

The first plan of improvement, designated as Plan A and shown on Plate 1, involves the construction of a vertical steel sheet pile breakwater with its base located about 30 feet below mean low water (MLW); a top width of 50 feet; a top elevation of 26.0 feet above MLW; and a total length of 1,500 feet. The structure would extend from a point south of Shackford Cove to just north of the Mearl Corporation. In addition consideration was given to dredging a one acre anchorage to a depth of 15 feet below MLW behind the structure. In order to afford protection to this anchorage and the shoreline in the area from northeast storms the north end is turned toward the shore. In order to utilize the new breakwater to offload fish and other commercial cargo it will be necessary to provide a public access connecting the breakwater to the shore similar to the existing breakwater access. Connecting the breakwater to the shore with a solid fill structure may change the tidal flow pattern in the area which in turn could be detrimental to the water quality. Based on this, it appears that provisions will need to be made to allow for tidal flow through the access. As was the case with the existing breakwater/pier the cost of the access will have to be born entirely by local interests. During the course of the study quantity and cost estimates were developed for use by local interests for constructing a public access ramp connecting the breakwater to the land along the south bank of Shackford Cove. The length of the access was determined to be about 350 feet and it was assumed that the construction and crossection of the structure would

be similar to the breakwater.

It is felt that if the breakwater is built it will meet most of the existing and future long term needs of the local interests. It will provide protection to the Eastport waterfront from Shackford Cove to just south of the existing breakwater, it will afford protection to the existing anchorage, it will encourage redevelopment of the downtown business district and it is hoped it will be the focal point for the revitalization of the economy in Eastport.

The second plan, Plan B, shown on Plate 2 consists of the construction of a vertical steel sheet pile breakwater with its base located about 23.0 feet below (MLW); a top width of 50 feet; a top elevation of 26.0 feet above MLW; and a total length of 1,000 feet. The structure would extend from a point just south of the Mearl Corporation to a point a little south of the existing breakwater. In addition consideration was given to dredging a one acre anchorage to a depth of 15 feet below MLW behind the structure. In order to afford protection to this anchorage and the shoreline in the area from northeast storms the north end is turned toward the shore. Additionally, in order to utilize the new breakwater to offload fish and other commercial cargo it will be necessary to provide a public access connecting the breakwater to the shore similar to the existing breakwater access. As was the case with Plan A, connecting the breakwater to the shore with a solid fill structure may change

the tidal flow pattern in the area which in turn could be detrimental to the water quality. Accordingly, it appears that provisions will need to be made to allow for tidal flow through the access. As was the case with the existing breakwater/pier the cost of the access will have to be borne entirely by local interests. Quantity and cost estimates were developed for use by local interests for constructing a public access ramp connecting the breakwater to the land at a point just south of the Mearl Corporation. The length of the access was determined to be about 300 feet and it was assumed that the construction and cross section of the structure would be similar to the breakwater.

As in the case with Plan A, it is felt that if the breakwater is built it will help meet a large portion of the immediate and long term needs of the local interests. However, it will not afford protection to as large a portion of the Eastport waterfront from southeast storms as that provided by Plan A. The area from just south of Shackford Cove to a point just south of the Mearl Corporation will not be afforded protection under this plan. The existing and future development in this area will continue to be susceptible to wave attack and flooding during severe southeast storms. However, it will afford protection to the highly developed portion of the downtown business district as well as the existing anchorage both of which are items of immediate concern to local interests. In addition it is anticipated that its construction will

encourage redevelopment of the downtown commercial district and serve as a catalyst for the revitalization of the economy in Eastport.

The third plan, Plan B-1 shown on Plate 3 is the same as Plan B with the exception that no consideration was given to providing an access ramp to connect the structure to the shore nor to the dredging of an additional protected anchorage. Without provisions for an access ramp from shore the structure cannot be used to offload fish and other cargo. However, it will afford a similar amount of protection to the Eastport waterfront and the existing anchorage as that provided by Plan B.

ECONOMIC ANALYSIS

The economics associated with the plans of improvement evaluated in the report are dealt with in this section. A discussion of the costs, benefits and economic justification for the various plans are included. In order to establish economic justification for the considered plans it is necessary to make a comparison between the equivalent average annual charges (i.e., interest, amortization and maintenance costs) with an estimate of the equivalent average annual benefits that would be realized over the 50-year study life used. Appropriate values given to costs and benefits at the time of accrual are made comparable by conversion to an equivalent time basis using an appropriate interest rate. A directed interest rate

of 6-7/8% now applicable to public works projects was used in the report. Local costs for public access facilities are considered self-liquidating and are not included in the project economics.

FIRST COSTS

The estimated first cost of the various considered plans of improvement are shown in Tables 8, 9 and 10. The principal features of the plans are shown on Plates 1, 2 and 3. Due to the preliminary nature of this stage of the study the quantity estimates have been developed from existing information. If it is found to be feasible to continue on to the next stage of the study detailed topographic, hydrographic and subsurface surveys will be performed and the quantity and cost estimates will be updated to reflect the results of these investigations. The estimates developed include monies for materials, contingencies, engineering and design work and supervision and administration charges. The figures shown are based on 1978 price levels.

TABLE 8

ESTIMATED FIRST COST OF PLAN A

1500 FOOT LONG BREAKWATER
AND A ONE ACRE ANCHORAGE WITH DEPTH 15' MLW

Breakwater 1500' x \$5,350/L.F.	\$ 8,025,000
Contingencies (20%)	<u>1,605,000</u>
Subtotal	\$ 9,630,000
Engineering and Design (4%)	<u>385,200</u>
Subtotal	\$10,015,200
Supervision and Administration (6%)	<u>600,900</u>
Total Cost of Breakwater	\$10,616,100
Dredging One Acre Anchorage	
10,000 c.y. @ \$7.40/c.y.	\$ 74,000
Contingencies (15%)	<u>11,100</u>
Subtotal	\$ 85,100
Engineering and Design (6%)	<u>5,100</u>
Subtotal	\$ 90,200
Supervision and Administration (8%)	<u>7,200</u>
TOTAL DREDGING COST	\$ 97,400
TOTAL COST OF BREAKWATER	<u>10,616,100</u>
TOTAL PROJECT COST	\$10,713,500*

* This does not include the cost of the 350 foot long public access ramp that was estimated to cost \$2,176,400 and which has to be borne entirely by the local interests.

TABLE 9

ESTIMATED FIRST COST OF PLAN B1000 FOOT LONG BREAKWATER
AND A ONE ACRE ANCHORAGE WITH DEPTH 15' MLW

Breakwater 1000' x \$4,835/L.F.	\$ 4,835,000
Contingencies (20%)	<u>967,000</u>
Subtotal	\$ 5,802,000
Engineering and Design (4%)	<u>232,100</u>
Subtotal	\$ 6,034,100
Supervision and Administration (6%)	<u>362,000</u>
Total Cost of Breakwater	\$ 6,396,100
Dredging One Acre Anchorage	
5,000 c.y. @ \$10.70/c.y.	\$ 53,500
Contingencies (15%)	<u>8,000</u>
Subtotal	\$ 61,500
Engineering and Design (5%)	<u>3,100</u>
Subtotal	\$ 64,600
Supervision and Administration (8%)	<u>5,200</u>
TOTAL DREDGING COST	\$ 69,800
TOTAL COST OF BREAKWATER	<u>6,396,100</u>
TOTAL PROJECT COST	\$ 6,465,900*

* This does not include the cost of the 300 foot long public access ramp that was estimated to cost \$1,698,100 and which has to be born entirely by the local interests.

TABLE 10

ESTIMATED FIRST COST OF PLAN B-1

1,000 FOOT LONG BREAKWATER

Breakwater 1000' x \$4,835/L.F.	\$ 4,835,000
Contingencies (20%)	<u>967,100</u>
Subtotal	\$ 5,802,000
Engineering and Design (4%)	<u>232,100</u>
Subtotal	\$ 6,034,100
Supervision and Administration (6%)	<u>362,000</u>
TOTAL COST OF BREAKWATER	\$ 6,396,100

ANNUAL CHARGES

In the case of the existing breakwater, it was assumed that the steel sheet pile breakwater was not durable enough to last for the full 50 year project life without a major overhaul or complete replacement. Therefore, the estimated annual charges for the existing breakwater structure were computed on the basis that it would have a useful project life of 25 years after which time it would need to undergo a major rehabilitation or replacement at a cost comparable to the initial cost of construction. Today, using a better grade of steel and with the aid of cathodic protection it has been assumed that the proposed breakwaters will have a useful service life of 50 years. It has been further assumed that there will be little or no maintenance costs associated with the breakwater for several years but it will increase steadily toward the end of the project life. The maintenance costs shown for the breakwater are based on the annual maintenance costs that have been incurred by the existing breakwater to date. Based on conditions in the existing federal anchorage it appears that Eastport Harbor is a nonsilting harbor and that maintenance costs associated with the new anchorage will be minimal if not non-existent. The annual charges shown below in Tables 11, 12, and 13 for the alternative plans considered are based on the

current directed interest rate for civil works projects of 6-7/8% amortized over the 50 year project life. In addition the estimate of annual charges shown in the tables include an allowance for maintenance of the breakwater structure.

TABLE 11

ANNUAL CHARGES FOR PLAN A

Breakwater	$(\$10,616,100 \times 0.07131)$	=	\$757,000
One Acre Anchorage	$(\$97,400 \times 0.07131)$	=	6,900
Breakwater Maintenance		=	<u>5,600</u>
TOTAL			\$769,500

TABLE 12

ANNUAL CHARGES FOR PLAN B

Breakwater	$(\$6,396,100 \times 0.07131)$	=	\$456,100
One Acre Anchorage	$(\$69,800 \times 0.07131)$	=	5,000
Breakwater Maintenance		=	<u>3,700</u>
TOTAL			\$464,800

TABLE 13

ANNUAL CHARGES FOR PLAN B-1

Breakwater	$(\$6,396,100 \times 0.07131)$	=	\$456,100
Breakwater Maintenance			<u>3,700</u>
TOTAL			\$459,800

PROJECT BENEFITS

Benefits associated with navigation studies are determined and discussed relative to the value of transportation service, increased safety, reduction of hazards to vessels and damage to wharves, commercial fishing, recreational boating, land enhancement due to deposition of dredged material, and benefits such as flood control, bank stabilization, shore protection, and others which may result from considered projects. The evaluation is performed with an accuracy and precision consistent with the basic data and appropriate to each stage of the study.

Of the above mentioned benefits the ones associated with commercial fishing, recreational boating and shore protection are of relevance to the proposed breakwater improvement projects at Eastport. The following paragraphs contain a discussion and evaluation of these benefits.

COMMERCIAL FISHING

Benefits to commercial fishing activities can be taken for elimination of delays in entering and leaving a harbor, reduction in spoilage of fish, and reduction in loss of or damage to vessels and gear where applicable. It can be assumed that fish catch may be

increased by elimination of delays and thereby allowing for increased fishing time at the fishing grounds. However, estimates of the probable average annual catch must take into account the capability of the fishing grounds to sustain the expected yield and the availability of a market for the increased catch. Commercial fishing benefits should reflect the net value of the increased fish catch at a dock or "by boat", and by the damages preventable by the project.

At the request of the city of Eastport, a Mr. Richard Burgess who was working for the Eastern Maine Development District prepared a report in 1978 outlining the potential benefits he felt would accrue if a second breakwater/pier structure was built at Eastport. Some of the information in that report has been used in the development of benefits in this report. A copy of the report prepared by Mr. Burgess is contained in the Appendix.

1. Reduction in Loss of or Damage to Vessels and Gear

The existing breakwater in Eastport is utilized by some boat owners as protection for their vessels in times of storm. The existing pier is relatively small and with boats moored side by side only ten to twelve boats are afforded any degree of protection. The boats nearest the open end of the pier are impacted by winds and waves, and as a result are subject to storm damage. Boats which cannot be moored behind the existing pier or at other moorings must be taken

out of the water or ride out the storm at sea. This latter presents a significant problem since the currents throughout the bay are very strong. Local fishermen state that about twenty-two draggers and seiners in the area utilize the existing breakwater for repairing gear for loading supplies and for protection of vessels from storms and icing conditions. (The number of commercial fishing vessels reported in the Draft Task I - Study of Fish Pier Needs to Identify Highest Priority Projects, October 1978 was 21). They have estimated that the cost of repairs to boats each year as a result of ice and storm damage ranges from a low of \$800 to a high of \$2,000 per boat. The average annual cost per vessel is approximately \$1,000. The existing breakwater provides total protection to approximately six of the twenty-two vessels. At \$1,000 average loss experienced by 16 boats this equals \$16,000 annually suffered by fishermen each year as a result of storm damage and lack of adequate protection.

There are lobster boats and other vessels in the area, but it has been difficult to obtain estimates of damage to them according to the Burgess report. However, lobster is not landed in Eastport and the U.S. Department of Fish and Wildlife in a letter to the Corps of Engineers, contained in the appendix, reports that Eastport does not harbor boats that are equipped for extended fishing and that the commercial fishermen return back to port each day. On the basis of these comments it can be presumed that lobster boats are not present

in any significant number. To the extent that other vessels are present the potential damage would be larger than that calculated above.

The Marine Trades Education Center has two vessels that can be considered as part of the harbor fleet. However, based upon a discussion with Mr. Otto Miller Jr., of the aforementioned school, they have their own moorings for these vessels as well as two or three extra moorings that can be rented out. Thus, the actual risk potential could be less than estimated above if two or three fishing boats use these moorings.

The net of the above factors is that the figure of \$16,000 is appropriate for this level of study. Should the study progress the specific factors enumerated above will need to be integrated into the analysis.

2. Increased Fish Catch

A second benefit associated with the proposed breakwater would be an increase in the potential landed fish catch in Eastport Harbor. By providing a relatively calm place from which to unload fish the potential for landings during storm conditions would rise.

According to the Burgess report the majority of fish landings in Eastport take place at several private docks among which are Holmes Packing Corporation, the Mearl Corporation and Argenta Products

Company.

Holmes Packing is outside the existing breakwater and would also be outside the proposed ones. Argenta Products would be protected by the larger of the proposed breakwaters only, as it is already outside the existing one. One of the Mearl Corporation plants would be inside all of the proposed breakwaters. The existing public breakwater pier does not possess unloading facilities. In 1978 a private company leased space at the public facility for the purpose of pumping fish from boats to other holding facilities. This group supplied its own equipment.

Under present conditions the existing breakwater facility is not fully utilized. Although all of the proposed breakwaters would protect the existing breakwater and anchorage, only Argenta and one of the Mearl Corporation facilities would benefit from the larger of the proposed breakwaters as their own unloading facilities would be protected. In the case of the two smaller proposed breakwaters only the Mearl facility would be afforded protection. In all of the cases the Holmes dock would not be afforded any additional protection. There is also some doubt as to how long the Argenta facility will continue to exist and function. At the present time it is just barely being maintained. If a major storm occurs in the near future it may very well be heavily damaged. Unless extensive rehabilitation is performed it appears the Argenta facility may not

exist to benefit from the large breakwater facility if it were to be built in the future. Thus, unless the existing breakwater is used for unloading, only one facility would benefit from the proposed breakwater protection.

According to the Burgess report, "The proposed breakwater facility could provide shelter so that boats could land fish during more of the stormy days that occur. Last year, the season was approximately seven months in length, and the boats were unable to land fish about 8 days, because of storms or bad weather. According to the National Marine Fisheries Service of Gloucester, Massachusetts, the total landings of both shellfish and finfish in 1977 was 19,703,608 pounds at a value of \$957,012. The calculation would be 19,703,608 divided by 210 days equals 93,827 pounds per day, times approximately 5 cents per pound, times 8 days, which equals \$37,531 more dollars that would accrue to fishermen as a result of a new breakwater/pier to protect the waterfront area."

This benefit, however, can only be claimed if the existing breakwater is used to its fullest capacity for unloading fish. Presently, there's no guarantee that it will be utilized to full capacity due to a lack of unloading facilities and the almost exclusive use of private docks for unloading fish in the area. It should be noted that even if this benefit is claimed, the proposed project's economic feasibility would not be altered.

3. Future Fleet Expansion

A key factor in determining any future expansion of the fishing fleet is the sustainable yield of the fishery. That is will the additional pounds of fish be caught? The U.S. Department of Interior Fish and Wildlife Service describes the fishery at Eastport as follows:

"Although herring is the major commercial finfish species landed in Eastport, small seasonal fisheries also exist for cod, pollock and scallops.

The development of a large ground fishing fleet at Eastport is not likely in light of recent commercial fishing disputes between the U.S. and Canada. Prior to 1977, U.S. boats were allowed to enter Canadian waters in the Fundy region to fish for a variety of species--pollock, cod, haddock, flounder, hake, redfish, and others. However, both the U.S. and Canada recently extended their fisheries jurisdiction to 200 miles offshore, and heated disputes over valuable fishing grounds have resulted. Although both countries attempted to solve the problem with an interim "gentlemen's agreement" that contained reciprocal fishing privileges, Canada, as of summer of 1978, does not allow U.S. boats to fish in Canadian waters. Therefore, Eastport boats must travel west along the Maine Coast and fish on U.S. fishing grounds such as Georges Bank.

Eastport presently does not harbor boats equipped for extended fishing trips. Commercial fishermen return back to port each day. The distance to U.S. groundfish areas from Eastport is considerably greater than that from other ports such as Rockland, Portland, Gloucester or Boston. The Canadian and U.S. Governments are currently attempting to resolve their fishing disputes. However, until a new agreement is made with Canada to allow fishing in their waters by U.S. boats, the long trip to groundfish areas in U.S. waters is likely to discourage the development of commercial fishing in Eastport.

As mentioned earlier there is a seasonal fishery for scallops in the Eastport area during the winter. Many of the scallop fishermen use lobster boats and dock their vessels at Eastport, Lubec and other places. Commercial fishermen also dig soft-shell clams in the Eastport area. However, with the exception of isolated clam flats that are accessible only by boat, most clamming areas are reached from shore without the aid of a skiff."

If the proposed U.S.-Canadian agreement is reached it seems likely that the additional amount of fish could be caught. However, there is no reason to assume that any possible benefits would accrue to the proposed breakwater/pier unless the existing breakwater is used to its fullest capacity for unloading. It should be noted that even

if the fleet did grow, the benefits derived would still not significantly alter the economics given the large use of private docks outside the proposed breakwaters.

SHORE PROTECTION

Due to its location on the southeast portion of the land projection into Passamaquoddy Bay the city of Eastport is subject to the ravages of storm winds and waves entering the bay from both the northeast and the southeast. In both directions there is a relatively long fetch over which waves can build to sizeable proportions. In addition this region experiences tidal elevation changes of a large magnitude - about 18 feet on the average ranging from 13 feet at neap tide to 27 feet at spring tide. At certain times of the year high tides and storm winds combine to severely impact the coastline of the city.

Water Street is the main commercial and business street in Eastport. It runs along and parallels the waterfront area in Eastport. In the past the ocean side of Water Street and adjoining Sea Street were heavily developed. Many fish processing plants and other commercial structures were located on piers extending out into the ocean. This development was particularly pronounced around the turn of the century and the early 1900's. Pictures from this time period depict a great deal of business activity transpiring on these docks.

Since that time, however, these docks and structures have largely been destroyed due to the repetitive impact of the destructive forces inherent during ocean storms. Storm damages have resulted in the abandonment of several of the buildings which remain standing and property owners have not repaired the damage or restored their facilities because of the threat of damage from future storms.

The continued destruction of buildings on the seaward side of the downtown street could eventually lead to the elimination of the buffer zone protecting the land side of the streets. If this occurs continued storm damage, unless these buildings are maintained, could eventually threaten the vitality of the city.

In determining the potential shore protection benefits to be derived from a project such as that for Eastport the regulations under which the Corps operates stipulate the following:

"Hurricane and tidal flooding result from abnormal rises in tidal levels due to storms and from the inrush of waters as a result of waves. Measures for control of beach erosion and protection against hurricane and tidal flooding may include benefits from beach restoration, land loss and other physical damages prevented, emergency and business costs avoided, enhancement of property values, increased recreational usage and prevention of loss of historic or

scenic aspects of the environment. Benefits are measured as the difference in these values under conditions expected with and without the contemplated control measures."

In a more general sense the approach of the New England Division in analyzing past projects affording protection from tidal flooding, has followed two different methods of analysis. First, stage-damage curves relating flood elevation to flood dollar damages and stage-frequency curves relating flood elevation to chance of occurrence are calculated. The former are calculated based upon field surveys by Corps damage appraisers, while the latter are calculated by Corps hydrologists based upon observations of past phenomenon. Utilizing this information it is possible to derive damage-frequency curves which show frequency of attaining a specific level of damage. From these relationships it is possible to derive the average annual benefit associated with a project which affords protection to a specified frequency event. Second, in the absence of detailed stage-frequency relationships, which is the case in this particular situation, an assessment is made of the amount of money that property owners have spent to repair structures damaged by tidal flooding.

Then by averaging these damages over the time period during which they accrued and adjusting for possible frequency distortions, an average annual benefit associated with a given protection level can be estimated.

For the shoreline protection aspect of the proposed Eastport project the second approach should be utilized given the lack of stage-frequency relationships for this area, the level of this report, and the difficulty in integrating wave run-up into various stage-frequency relationships. The difficulty in applying the methodology outlined is that, as mentioned previously, little or no work has been done to repair tidally damaged structures. Thus with this approach the benefits calculated would be negligible. Therefore the approach taken here is to determine the valuation of the maximum potential damages prevented and to make an assessment of the possible frequency of that flood height being attained based upon the knowledge of people in the area as to flood height history.

To determine the potential benefits associated with a proposed breakwater in this region the future without condition is established first. For the city of Eastport this presents a difficult situation, since the city is currently involved in a detailed assessment of their long run development plans. There also is the added possibility of the Pittston Refinery or the Cobscook Bay Tidal Power Project being constructed however, the Pittston project has been denied a permit due to concerns over the impact upon the bald eagle, and the Cobscook Bay Tidal project is only in an initial study phase.

Recently the city of Eastport has received preapplication approval

for a \$1.15 million grant from HUD for "Eastport Waterfront Redevelopment Program - Phase I: Erosion Control and Primary Public Facilities". Included in this money is funding to build a bulkhead-seawall along the entire downtown section. Therefore the future without condition presents a situation of very little damage. A breakwater would help reduce some potential damages in major events. Additionally, the breakwater might reduce some of the wear on the bulkhead, but this would be minor since most of the wear would be from corrosive seawater.

Overall, it appears the benefits for shore protection from the proposed breakwater would be small and are not quantified.

RECREATIONAL BOATING

This area of Maine experiences a great deal of recreational boating up and down the coast. As a port of entry, Eastport is a necessary stop for boats heading into foreign waters. According to local officials some interest has been expressed by transient recreationalists to have a marina in Eastport. Their concern is that the existing facility does not permit full utilization by recreational people. While this potential may exist it was not felt to be the prime purpose of the breakwater, firm commitments haven't been made, and there is some tension between the recreationalist and commercial fishermen in the utilization of the existing pier which might inhibit potential growth of this project facet.

BOAT BUILDING

While this project conceivably could lead to more rapid boat replacement and therefore lead to higher income to local boat builders; the project is felt to be only a necessary and not sufficient condition for this to occur.

SUMMARY

The net result of this benefit analysis indicates that the total annual benefit that could be credited to the construction of the proposed breakwater in Eastport is:

Reduction in loss of or damage	
to vessels and gear	\$16,000

ECONOMIC JUSTIFICATION EVALUATION

By comparing the annual benefits that are expected to accrue from the proposed project versus the annual costs that would be incurred if the project was built a determination of the economic justification for the proposed project can be made. Only items to which a monetary value can be attached are included in the evaluation. According to the current regulations under which the Corps operates a project is considered to be economically justified if the benefit-to-cost ratio is greater than unity. The benefit-to-cost ratio that were determined for the plans of improvement evaluated in this study are shown in Table 14 below. As can be seen from the table none of the considered plans show economic

justification for Federal participation or cost sharing.

TABLE 14

SUMMARY OF ECONOMIC ANALYSIS

<u>PLAN</u>	<u>DESCRIPTION</u>	<u>AVERAGE</u>		<u>BENEFIT</u>
		<u>ANNUAL</u>	<u>ANNUAL</u>	<u>TO-COST</u>
		<u>BENEFITS</u>	<u>CHARGES</u>	<u>RATIO</u>
A	1500' breakwater/pier			
	w/1 acre anchorage 15' mlw	\$16,000	\$769,500	0.02
B	1000' breakwater/pier			
	w/1 acre anchorage 15' mlw	16,000	464,800	0.03
C	1000' breakwater	16,000	459,800	0.03

SECTION V. Discussion, Conclusions and Recommendations

DISCUSSION

In response to a Congressional resolution this study has reviewed and evaluated all pertinent documents and considered the views of interested agencies and individuals in an attempt to determine the feasibility of modifying the existing Federal navigation project at Eastport Harbor, Maine. The study determined that the major problems presently facing the community of Eastport are the difficulties faced by the commercial fishing vessels and the shorefront erosion and damage occurring to waterfront facilities and structures during storms. Their immediate needs are concerned with

obtaining adequate protection for the fishing vessels and shorefront facilities during storm conditions. During the course of this study three alternative plans of protection and improvement were formulated to meet the existing and future needs of local interests. In addition an assessment was made of their potential economic, social and environmental impacts.

In addition to addressing these problems and needs in this study a concurrent investigation was conducted by the Corps in order to determine if the city was eligible for assistance with the erosion occurring along the Eastport Harbor waterfront under the Corps Section 14 authority. Unfortunately the investigation concluded that there is insufficient economic justification to recommend Federal assistance for erosion control improvements of public works facilities in Eastport. A copy of the correspondence regarding this matter is contained in the Appendix.

Along with requesting assistance from the Corps in the form of this study the city of Eastport is also actively trying to obtain assistance with their problems from other Federal and state agencies as well as on their own. They have recently received preapplication approval for a 1.15 million dollar grant from the Department of Housing and Urban Development to be used by them for Phase I of the Eastport Waterfront Redevelopment Program. One of the main items that is addressed in Phase I of their program is erosion control and

waterfront protection. Under this item they plan to build approximately 400 feet of steel bulkhead and 600 feet of concrete seawall on the seaward side of Water Street in the area of the business district of Eastport. This is the area of immediate concern to the community.

The community also has recently had legislation enacted to allow them to increase the limit of indebtedness of the Eastport Port Authority from \$500,000 to six million. This was done in anticipation of possible future development of an industrial park-port complex on a 40 acre tract of land near Kendall's Head by the Eastport Port Authority. The voters of Eastport approved the legislation by a referendum vote on May 15, 1979.

The Department of Transportation of the state of Maine has been conducting a study in which they are evaluating the fisheries and considering the needs of fish pier construction at various locations along the Maine coast. Upon completion of the study they hope to get a state bond issue passed for fish pier construction. The monies would then be available to help communities in Maine construct a fish pier if they can show the state they have the greatest need and there is sufficient justification that it will be highly used. The Eastport City Council has recently appropriated a sum of money to hire a consulting firm to conduct a feasibility study for then regarding the feasibility of constructing a fish pier

in Eastport. If the study shows that it is feasible, they plan on applying to the State Department of Transportation for funds to construct a fish pier in Eastport.

All of these items help to point out the intense enthusiasm and interest the local interests have in improving the social and economic conditions in Eastport.

CONCLUSIONS

In response to the needs and desires of local interests this study evaluated three alternative plans of improvement involving the construction of a breakwater parallel to the Eastport Harbor waterfront south of the existing breakwater with an additional protected anchorage behind the structure. It is felt that a structure such as this would help minimize the damage and stabilize the shoreline in the downtown business district of Eastport, afford protection to the existing Federal anchorage during southeast storms and act as a catalyst to help stimulate economic activity in Eastport.

The annual cost of constructing each of the alternative plans of improvement was compared to the benefits that may be expected to accrue if they were built and in all cases the annual costs were found to far exceed the annual benefits. This indicates that there is not sufficient economic justifications for Federal participation

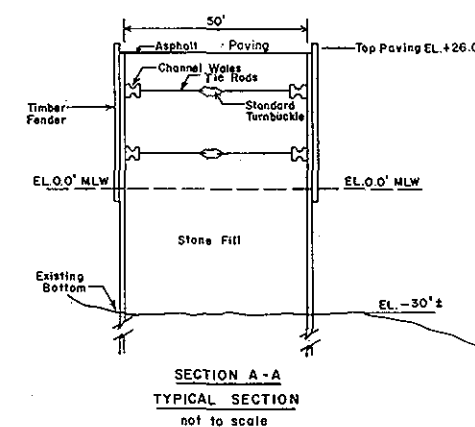
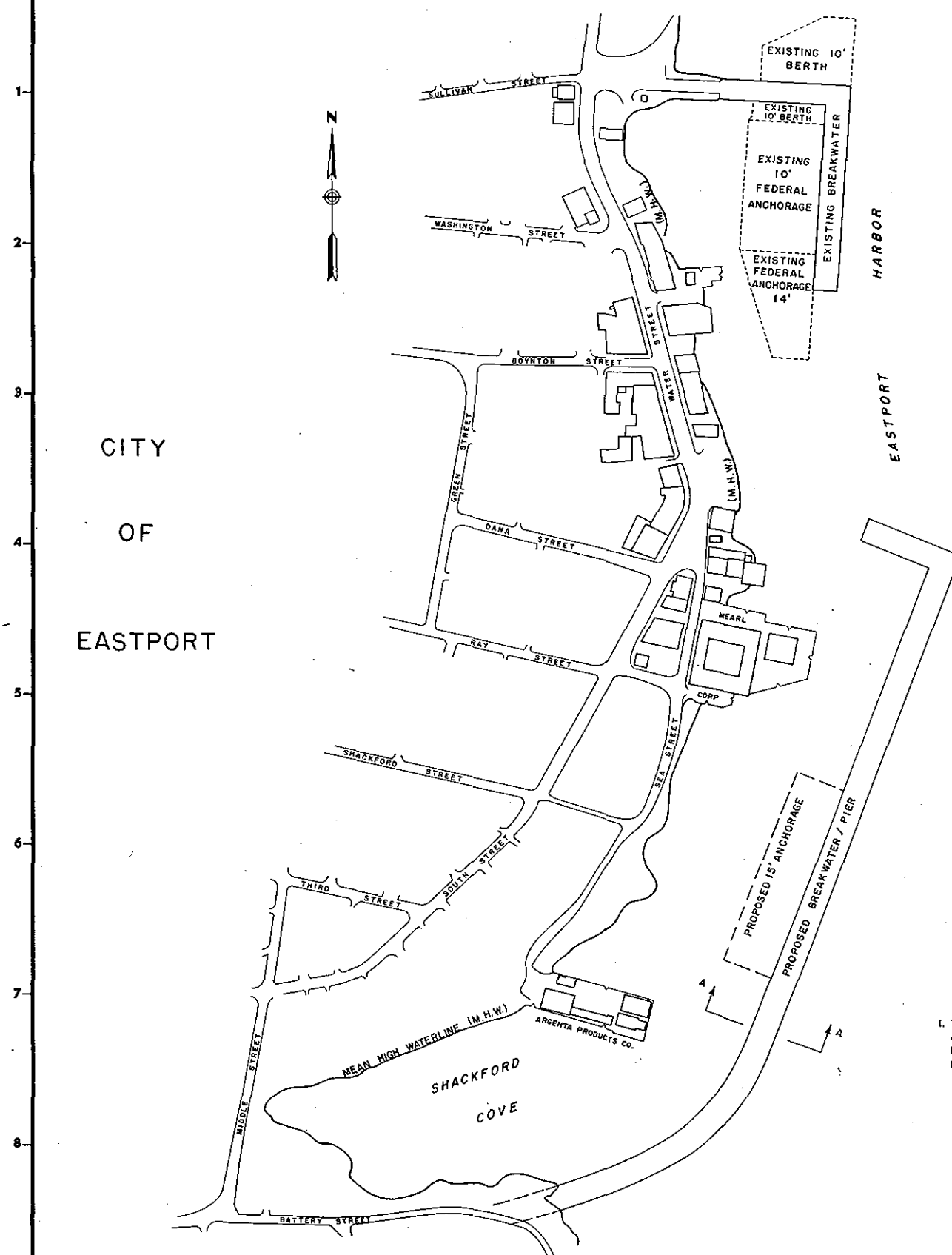
and cost sharing.

However, it appears tht the community of Eastport has several other sources of assistance that may be available to them in the near future to meet their needs. Several of them appear to be promising. At a later date, if the city is successful in some of these endeavors they may be able to obtain assistance from the Corps in carrying out their plans.

In addition, at the present time both commercial and recreational vessels tie up parallel to the existing breakwater and outboard of one another. This method is known as "rafting". In most instances past experience has shown this method to be inefficient and potentially dangerous. Whenever, possible this method is not recommended. The community may want to consider using a different mooring management to more effectively utilize the existing anchorage behind the breakwater.

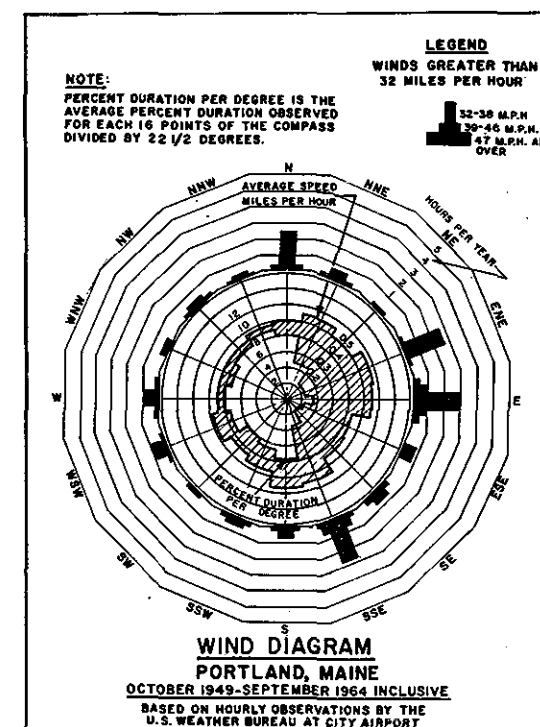
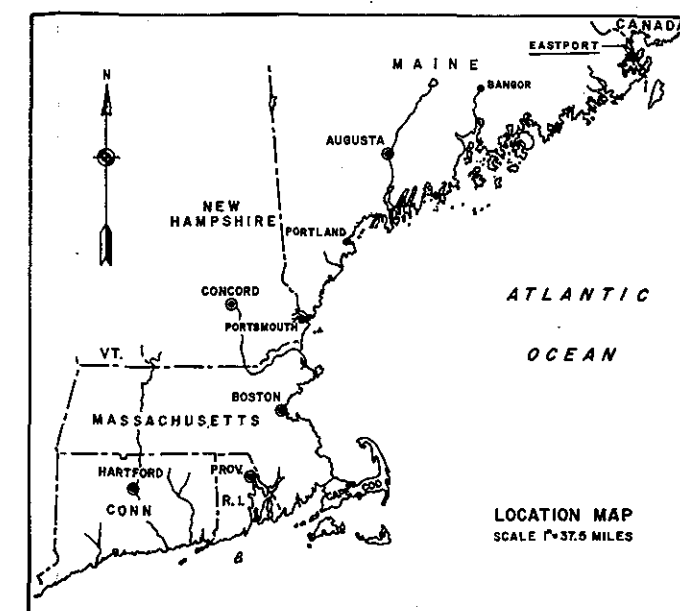
RECOMMENDATIONS

After careful review of the study findings the Division Engineer recommends that the study should be terminated at this stage in light of the lack of economic justification for modification of the existing Federal navigation project in Eastport Harbor, Maine.

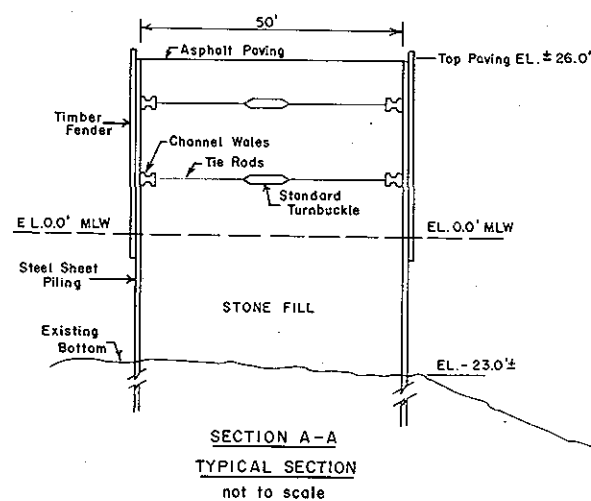
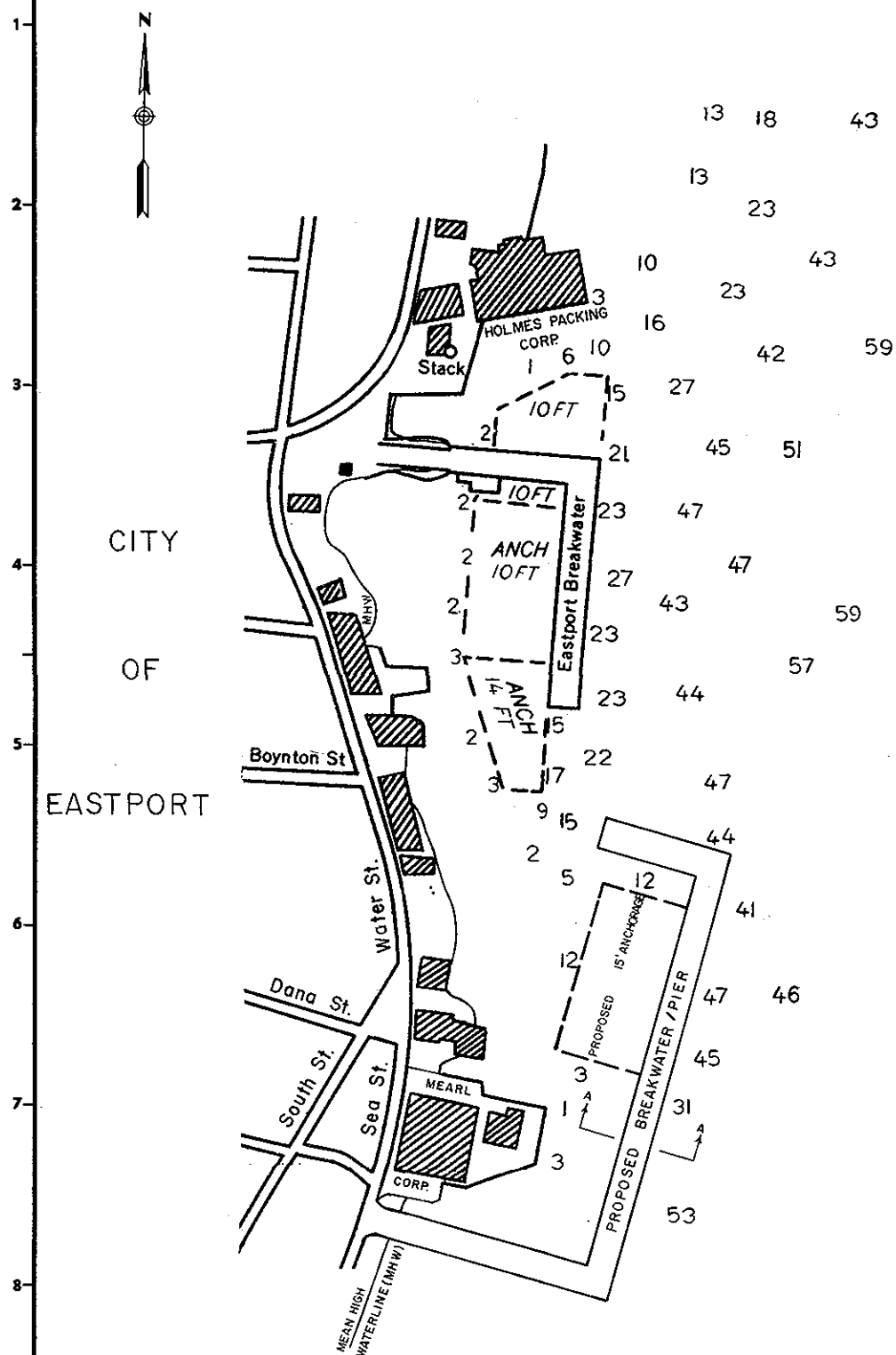


NOTES

1. TOPOGRAPHY FROM PLAN DEVELOPED BY JAMES W. SEWALL COMPANY, OLD TOWN, MAINE BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHS DATED 7-13-78

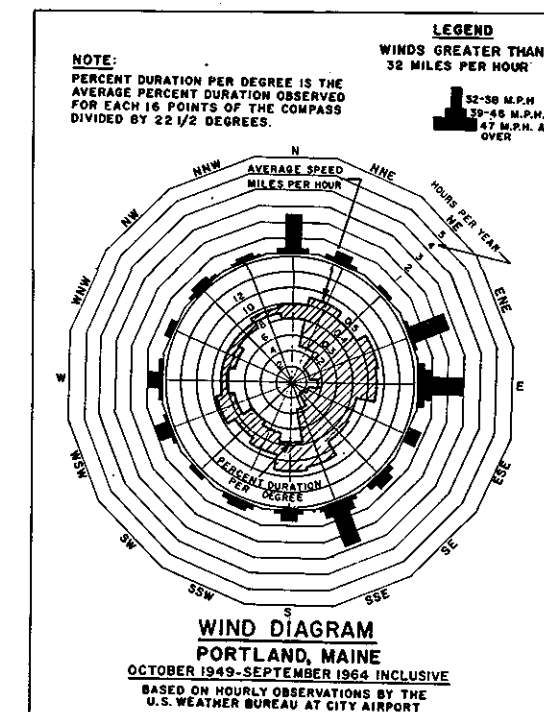
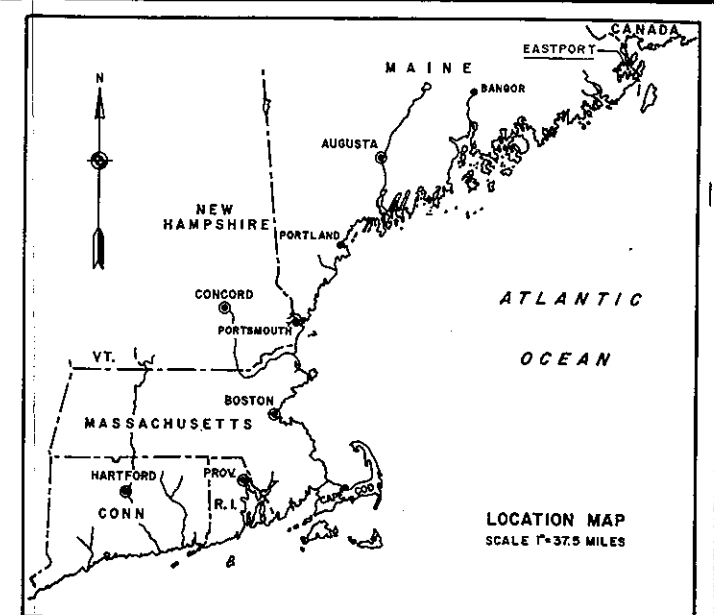


NAVIGATION STUDY
EASTPORT HARBOR, MAINE
LOCATION MAP
NEW ENGLAND DIVISION, CORPS OF ENGINEERS



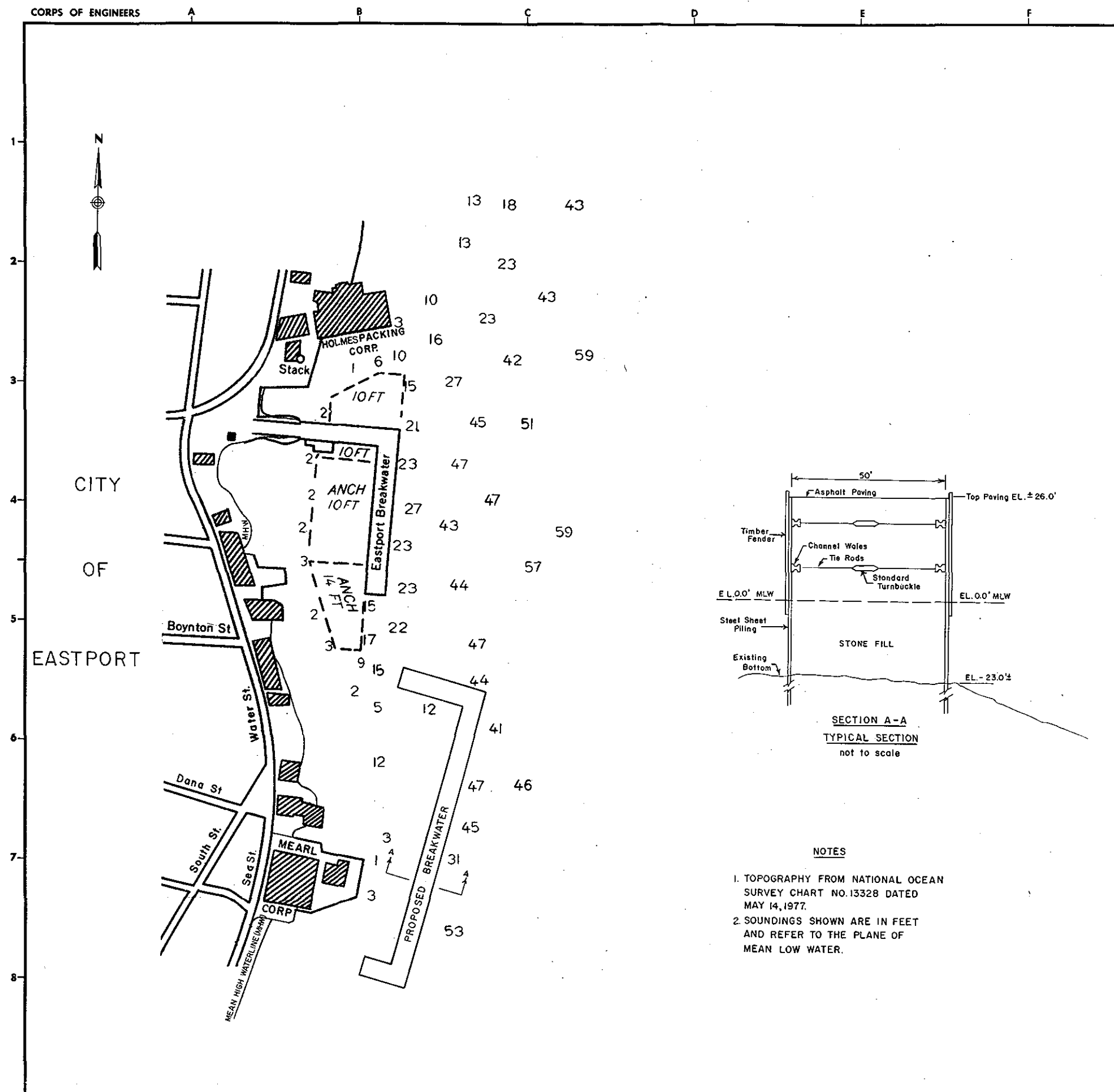
NOTES

1. TOPOGRAPHY FROM NATIONAL OCEAN SURVEY CHART NO. 13328 DATED MAY 14, 1977.
2. SOUNDINGS SHOWN ARE IN FEET AND REFER TO THE PLANE OF MEAN LOW WATER.



NAVIGATION STUDY
EASTPORT HARBOR, MAINE
CONSIDERED PLAN OF
IMPROVEMENT

NEW ENGLAND DIVISION, CORPS OF ENGINEERS



NOTES

1. TOPOGRAPHY FROM NATIONAL OCEAN SURVEY CHART NO. 13328 DATED MAY 14, 1977.
2. SOUNDINGS SHOWN ARE IN FEET AND REFER TO THE PLANE OF MEAN LOW WATER.

APPENDIX



UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
P.O. Box 1518
Concord, New Hampshire 03301

FEB 23 1979

Division Engineer
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Attention: Bill Coleman

Dear Sir:

This planning aid letter is designed to assist you in your survey scope study of a new breakwater structure at Eastport Harbor, Maine. It is prepared under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

The purpose of this letter is to describe the fish and wildlife resources currently existing in the Eastport area and to point out possible problems and opportunities associated with the harbor project. It should be pointed out that our comments on the impacts of this project are only speculative, pending a detailed project description by the Corps.

General Description

Eastport Harbor is located in the Passamaquoddy region of the Bay of Fundy, in an area renowned for its huge tides and nearshore deep water. Tidal range at Eastport averages about 18 feet, resulting in strong currents (in excess of 3 knots at times), tidal rips and whirlpools. Depths in excess of 350 feet occur within 1/2 mile of the harbor. The region consists of numerous islands, peninsulas, bays and intertidal areas. The high tidal range and bathymetric diversity act together to create a variety of marine habitats for fish and wildlife.

A unique aspect of the marine environment at Eastport is the presence of deepwater or coldwater organisms close to shore. In fact the marine fauna at Eastport is similar to that found on offshore bottom areas in the Gulf of Maine. For example, oceanic euphausiids (krill) and other zooplankton occur at times at the surface in enormous swarms, attracting large numbers of finfish, marine mammals and pelagic birds. One fish species that is commonly found at Eastport is the redfish (Sebastes marinus). This species is abundant in deeper waters of the North Atlantic and is normally found at depths of 40 to 200 fathoms in the Gulf of Maine. However, at Eastport redfish are commonly observed at the surface, feeding on euphausiids. The National Marine Fisheries Service reports this surface occurrence of redfish as unique throughout the species' range.

Eastport has been considered for many years as a possible location for a tidal power station due to the enormous tidal range. Similarly, the availability of deepwater close to shore has made Eastport an attractive site for potential port development including oil handling facilities. However, heavy industry is still absent at Eastport, which together with a lack of urbanization, has resulted in a pristine quality in the surrounding waters.

Commercial Fisheries

The major commercial fishing industry in Eastport is for herring. Historically, Eastport was considered to be the "Sardine Capital of the World." At the turn of the century, 16 sardine processing plants, employing about 2,200 people, were in operation in Eastport. Today only one cannery remains, the Holmes Packing Corporation, which seasonally employs about 100 people. Although a small fraction of the herring canned in Eastport is caught by Maine fishermen, at least 75 percent of the herring processed there is imported from Canada.

Eastport also has three processing plants that manufacture pearl essence from herring scales. The largest of these, the Mearl Corporation, is a thriving operation. Although pearl essence is artificially synthesized in other parts of the U.S., Eastport has the only plants making pearl essence from fish scales.

Although herring is the major commercial finfish species landed at Eastport, small seasonal fisheries also exist for cod, pollock and scallops. However, the development of a large groundfishing fleet at Eastport is not likely in light of recent commercial fishing disputes between the U.S. and Canada. Prior to 1977, U.S. boats were allowed to enter Canadian waters in the Fundy region to fish for a variety of species--pollock, cod, haddock, flounder, hake, redfish, and others. However, both the U.S. and Canada recently extended their fisheries jurisdiction to 200 miles offshore, and heated disputes over valuable fishing grounds have resulted. Although both countries attempted to solve the problem with an interim "gentleman's agreement" that contained reciprocal fishing privileges, Canada, as of summer 1978, does not allow U.S. boats to fish in Canadian waters. Therefore, Eastport boats must travel west along the Maine Coast and fish on U.S. fishing grounds such as Georges Bank.

Eastport presently does not harbor boats equipped for extended fishing trips. Commercial fishermen return back to port each day. The distance to U.S. groundfish areas from Eastport is considerably greater than that from other ports such as Rockland, Portland, Gloucester or Boston. The Canadian and U.S. Governments are currently attempting to resolve their fishing disputes. However, until a new agreement is made with Canada to allow fishing in their waters by U.S. boats, the long trip to groundfish areas in U.S. waters is likely to discourage the development of commercial fishing in Eastport.

As mentioned earlier there is a seasonal fishery for scallops in the Eastport area during the winter. Many of the scallop fishermen use lobster boats and dock their vessels at Eastport, Lubec and other places. Commercial fishermen also dig soft-shell clams in the Eastport area. However, with the exception of isolated clam flats that are accessible only by boat, most clamming areas are reached from shore without the aid of a skiff.

Recreational Fisheries

Recreational fishing in the waters around Eastport has not been quantitatively assessed. However, anglers reportedly do fish for the following saltwater species in the Eastport area: flounder, mackerel, cod, pollock, striped bass, and redfish. As mentioned previously, the Eastport area is the only place on the east coast of the U.S. where redfish can be caught by anglers fishing from shore.

Other Marine Resources

Because of its unique hydrographic conditions, the Passamaquoddy region is extremely productive of a diverse fauna and flora. In addition to the commercially and recreationally important fish species mentioned previously, the waters around Eastport are also important wintering or seasonal stopover areas for numerous species of pelagic birds. During winter months various diving ducks (eiders, scoters, oldsquaw, bufflehead, goldeneye and scaup) are common, together with dovekies and cormorants. In summer and fall, large flocks of phalaropes and kittiwakes can be seen near Eastport. Phalaropes have been observed in numbers unrivaled elsewhere along the U.S. East Coast. Both the herring and black backed gull are abundant throughout the year.

Marine mammals, including harbor porpoises, seals and whales are commonly observed in the Quoddy region. Included among the various species of great whales that occur in this area are the northern right and finback whales, both endangered species. Although not federally protected by law the harbor porpoise population centered in the Quoddy region is considered by some to be the last healthy population of this animal in existence.

Cobscook Bay is considered to be the most important breeding area in the Northeast United States for the bald eagle, an endangered species. Although environmental contaminants and urbanization have greatly reduced the eagle's range in the Northeast, eastern Maine has remained relatively pristine. In addition to nesting there, eagles use Cobscook Bay in winter, when the large concentrations of waterfowl serve as an abundant source of food. During other times of the year, eagles rely more on fish, particularly alewives and herring.

Rivers flowing into Cobscook and Passamaquoddy Bay support runs of anadromous fish, principally Atlantic salmon and alewives. The Dennys River in Maine is one of just six rivers in the U.S. that contains a self-sustaining population of Atlantic salmon. Salmon also enter the St. Croix, Didgeguash and Magaguadavic Rivers in New Brunswick. Alewife runs occur in the Dennys and Pennamaquan Rivers in Maine as well as in Canadian streams flowing into Passamaquoddy Bay.

Impacts of Proposed Breakwater

Based on our knowledge of the project area, the proposed breakwater at Eastport will probably have minimal impact on fish and wildlife habitat. However, pending further details from the Corps on this project, our assessment of impacts must remain speculative.

An extended solid breakwater structure may result in a significant decrease in flushing and could present a water quality problem. Eastport presently does not have waste treatment facilities, although they are currently studying their feasibility. Untreated domestic and industrial wastes are discharged directly into the waters around Eastport. The tidal currents are sufficient to disperse the wastes currently discharged from the waterfront. However, should tidal flushing be substantially reduced by the breakwater, a water quality problem might develop. The Corps should consider leaving a portion of the breakwater open to ensure adequate flushing of the waters behind the structure.

We again wish to call your attention to the presence of redfish at the Eastport waterfront. We recommend close coordination with the National Marine Fisheries Service in Gloucester and Woods Hole, Massachusetts due to potential impacts on nearshore redfish habitat. Eastport Harbor has been proposed as a marine sanctuary by NMFS under the Marine Sanctuaries Act (16 U.S.C. 1431-1434) due to the unique redfish situation.

Opportunities for Mitigation

A breakwater structure at Eastport should afford ample opportunities for recreational fishing. However, construction will result in some loss of groundfish habitat. As a mitigative measure, consideration should be given to creating additional habitat by building a rock-sided structure rather than a sheet-steel breakwater. The rock structure would create excellent habitat for redfish and other sportfish presently found at Eastport.

We appreciate the opportunity to assist the Corps in planning for this project.

Sincerely yours,

Jonathan E. Bushoff

Jonathan E. Bushoff

Literature Sources

Literature sources that were reviewed for this report include:

1. International Passamaquoddy Fisheries Board Report to International Joint Commission, October 1959. (Tidal Power Study)
2. Environment Canada. 1974. Summary of physical, biological, socio-economic and other factors relevant to potential oil spills in the Passamaquoddy Region of the Bay of Fundy. Fisheries and Marine Service Tech. Report No. 428.
3. U.S. Environmental Protection Agency. 1978. Final Environmental Impact Statement, proposed issuance of federal permits to the Pittston Company of New York for the construction of a 250,000-barrel/day oil refinery and marine terminal - Eastport, Maine. U.S. Environmental Protection Agency, Region 1, Boston.
4. U.S. Army Corps of Engineers. 1978. Draft Plan of Study for the Tidal Power Study, Cobscook Bay, Maine, USA. New England Division, Waltham, Mass.

In addition to reviewing the above literature, we consulted with personnel from the National Marine Fisheries Service in Gloucester and Woods Hole, Massachusetts, and in Rockland and Eastport, Maine. An inspection of the Eastport waterfront area was recently made in conjunction with another project.

16 February 1979

Mr. Harry Vose, President
Eastport City Council
City Hall
Eastport, Maine 04631

Dear Mr. Vose:

This will inform you of our findings resulting from reconnaissance scope investigations of coastal erosion problems in Eastport, Maine. In response to a request for assistance from the Eastport City Council, members of my staff met with you and other interested parties on 14 December 1978 to inspect the problem areas. As a result of our investigation, it has been determined that there is insufficient economic justification to recommend Federal assistance for erosion control improvements of public works facilities in Eastport. This study was conducted under authority contained in Section 14 of the 1946 Flood Control Act, as amended.

During the course of our inspection, two separate problem areas were identified along the shoreline, fronting on Friar Road Passage. The shoreline along this reach is subject to erosion from severe southeasterly storms when combined with incoming tides. This shoreline was previously protected by wharves that extended seaward from properties along Water Street. However, due to the decay and loss of these wharves over many years, the shoreline is now more exposed to coastal storm actions.

The first area that was inspected involves a 200 foot length of shoreline that is adjacent to Sea Street. The edge of the roadway along this reach coincides with the top of the bank which forms the shoreline. During the coastal storm of February 1978, this section experienced extensive erosion, and emergency funding was allocated for repair. The required work consisted of the repair of the roadbed with gravel fill and the placing of stone protection on the seaward slope.

16 February 1979

Mr. Harry Vose, President

The second erosion site that was inspected involves a 650 foot section of shoreline along Water Street. This section of waterfront is located between the American Can Company Building and the theater. These properties are primarily privately owned. The only public property along this reach is a parking lot which serves customer and employee parking for the stores and factories in the vicinity. The parking lot has suffered minor erosion to its seaward slope and shoulder as a result of recent coastal storms. At several locations the shoulder is approximately one foot lower in elevation than the immediate edge of the parking surface.

Under the Section 14 authority, the Corps of Engineers is authorized to construct emergency shoreline protection works to prevent damage to highways, public works and essential public services endangered by bank erosion, provided the required improvements are feasible and economically justified. Because Sea Street is adequately protected for the usage of the roadway and because the majority of the erosion problem areas located along Water Street are situated on privately owned lands, the municipal parking area was the only area that had direct application on the Section 14 authority.

About 200 linear feet of the shoreline area of the parking lot is exposed to tidal erosion during storm periods. There is presently some dumped riprap on this shorefront which tends to lessen the severity of the erosion condition.

It was estimated that about \$50,000 would be required to provide complete protection to the parking lot. The proposed project would have included placement of compacted fill to raise the elevation of the parking lot and placement of stone slope protection on gravel bedding stone along the ocean side of the lot. However, estimated benefits that would accrue from this work do not justify the expenditure of Federal funds for this project. Due to this lack of economic justification, I am unable to recommend Corps of Engineers assistance in alleviating tidal erosion conditions in Eastport, Maine.

For your information, we have inclosed some typical cross-sections of erosion control improvements that the City of Eastport might undertake

SDPL-P

16 February 1979

Mr. Harry Vose, President

to halt further erosion of the shoreline. It should be understood that these cross-sections are general in nature, and it is suggested that the city engage the services of a private consulting engineering firm to make specific recommendations for corrective measures.

If we can be of any further assistance, please contact this office.

Sincerely yours,

1 Incl
as stated

JOHN P. CHANDLER
Colonel, Corps of Engineers
Division Engineer

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STRUCTURAL MEASURES

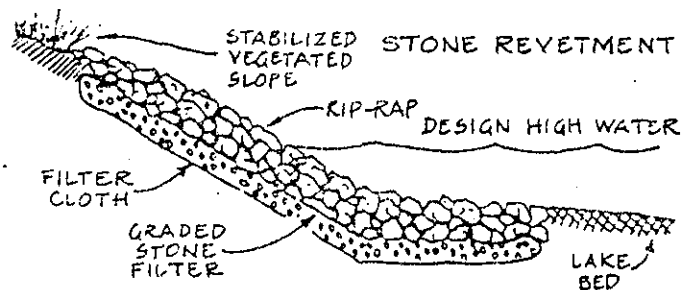
Once natural barriers such as large rocks and trees are removed from the toe of the bank, wave and ice action quickly erode the soil. When this happens, the alternative is usually a structural solution. These solutions often take the form of revetments or retaining walls. Revetments serve primarily as protection against wave action. Retaining walls serve the dual role of preventing sliding and slumping of bank soil and preventing erosion from direct wave or ice action. The design and construction of these devices generally require the services of an engineer or contractor. The following information will provide the reader with a basic idea of how the structure functions as well as some information about its construction.

REVETMENTS

Stone Revetment: A stone revetment is often a cost-effective shore protection device if stone of sufficient size and quantity is available locally. When properly designed and constructed, revetments dissipate wave action. They adjust to minor displacement and settling, require little maintenance, and can be repaired easily. In addition, they require no internal drainage and have a long service life. Revetments may be more aesthetically and environmentally acceptable than retaining walls.

Riprap is subject to displacement. The effectiveness of the structure is impaired as waves cause rocks to tumble from the system or as settling of the material occurs. Restoration of the rock slope, protection of the top of the structure, removal of unequal thickness, and reduction of spaces in the facing will frequently be necessary.

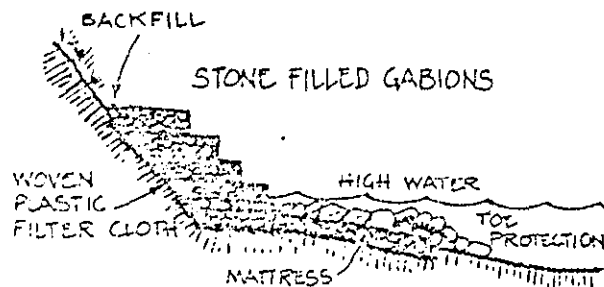
Costs: Costs for stone revetments will range from \$40-\$150 per linear foot, depending on the height of the structure.



Gabion Revetment: Revetments can be constructed by filling gabions, which are steel wire mesh baskets, with stones. They are commercially available. The manufacturer's instructions should be followed closely. Rest the structure on a wire mattress to protect it from scour. Gabion structures maintain their strength even if the foundation settles somewhat. When constructing a gabion revetment, fill gabions with any stone material larger than the mesh, stagger the joints between baskets as if staggering the joints between bricks in a wall to make a stronger structure, and anchor the lakeward end of the mattress with large stone or anchor screws.

The life of the gabion protection depends on the durability of the wire. Replace broken wires with galvanized or plastic coated wire. Severe storms will occasionally move baskets, indicating foundation failure or scour at the toe. Repair all storm damage immediately. Baskets are usually replaceable.

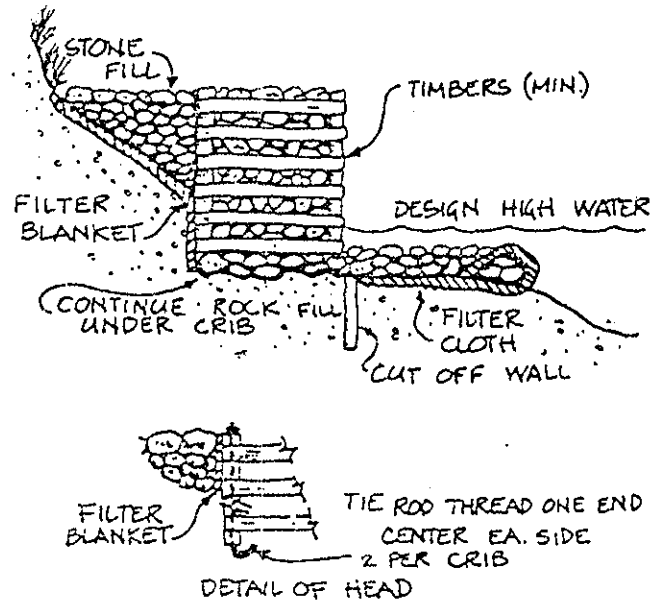
Costs: The cost range for gabion revetments is \$40 to \$85 per linear foot, depending upon height.



RETAINING WALLS

Rock-filled Timber Crib: Rock-filled timber cribs are sometimes used for short retaining walls. Timber cribs use log-headers and stretchers. Headers must be long enough to hold together a stable mass of backfill. Dimension lumber can also be used. Backfill for cribs must be self-draining and secure against erosion. The base of the toe must be protected from scour. To inhibit decay, treat timbers with a wood preservative. Notch logs to reduce spacing between them. Fill the crib with field stone. Provide a brush mattress and gravel bed foundation. Backfill area between bank and crib with bank run gravel. Place a splash apron on the backfill.

Costs: Costs range from \$60 to \$80 per linear foot, depending on crib height.



PROPOSED NEW BREAKWATER PIER AT EASTPORT

Economic Benefits That Would Accrue to the City of Eastport as a Result of the Construction of a Breakwater Pier at That Location.

IMMEDIATE BENEFITS:

1. Decrease In Storm Damage - Waterfront Structures

The City of Eastport, located on the southeast portion of a land projection into the ocean, is subject to the ravages of storm winds and waves entering Passamaquoddy Bay from the southeasterly direction. At certain times of the year, exceptionally high tides and storm winds combined, are severely damaging to the coastline of the city. The main street and the business district extends along the waterfront. Because there has been no protection from such storms, buildings and wharves along the water's edge have received frequent buffeting, resulting in destruction of many of the waterfront facilities. Also, there has been widespread erosion of the land. Individual property owners have lost hundreds of thousands of dollars worth of property, and the city has suffered the loss of tax revenues from such property losses. Progressive erosion has removed soils, rock, and retaining walls on which much of the waterfront property was anchored. Storm damage has resulted in the abandonment of several of the remaining buildings, and property owners have not repaired the damage or restored the facilities because of the threat of future damage from future storms. Although several valuable buildings remain in use as commercial enterprises, there is a disincentive for owners to upgrade or expand them. Potential capital investors are discouraged from making capital improvements or investments in the area. Short term year-to-year losses, and the cumulative long term loss of facilities and the tax revenues have contributed greatly to the overall economic decline and high rate of unemployment in the city.

Continued destruction of waterfront commercial properties and soil erosion are exposing valuable commercial buildings on the opposite side of Main Street to the ravages of storms. The street itself is exposed to undermining action by water, and the breakers can travel right over the street to the buildings on the opposite side, whose property owners could be faced with similar problems of destruction. The economic loss of waterfront properties has been crippling to the local economy and to tax revenue. Continued further losses could be devastating. The city does not have sufficient revenues to rebuild the area nor to maintain it against severe weather conditions. Only a breakwater or breakwater pier can prevent eventual complete destruction of the major portion of the downtown commercial district.

The City of Eastport commissioned an outside independent agency, Downeast Adjusters and Appraisers of Ellsworth, Maine, to study and record property losses along the waterfront area of the commercial district. Their documentation shows that the 1978 cost to replace the various structures destroyed at \$6,109,856.39 over the period from 1967 through 1977, or approximately 10 years. This means that the average cost per year was \$610,986. During that same period, the tax rate averaged approximately \$45.00 per thousand (there was a state revaluation in 1976, which increased the property values and reduced the mill rate). Therefore, the tax loss in terms of the 1978 replacement cost of the destroyed structures would be \$274,944 or an average of \$27,494 annually. Much commercial property still remains standing in the area. If damage is allowed to continue at approximately the same rate into the future, considerably more hundreds of thousands of dollars will be lost. As waterfront structures continue to be leveled, structures on the opposite side of the main street are becoming exposed, and they too will be destroyed.

2. Decrease in Storm Damage - Area Vessels

Area fishermen use the present small breakwater pier for protection of their vessels from storms and from icing conditions. Only a limited number of vessels are able to utilize the shelter of the pier effectively. The vessels are moored side by side behind the breakwater. Nevertheless, the two or three boats nearest the open end of the pier get buffeted by wind and waves and receive storm damage to planking, cabins, and deck gear. Fishermen state that there are 22 draggers and seiners in the area that utilize the present pier for unloading fish, for loading and repairing gear, and for loading supplies. Only ten or twelve boats (not all of them seiners or draggers) can moor at the Eastport pier at one time for protection. As a consequence, the others have to be moored in the open water. Fishermen say the cost of repairs to boats each year as a result of ice and storms run from a low of \$800 to a high of \$2,000 per boat (the Groundhog Day gale of 1977 is an example of a storm creating extreme damage to vessels all along the coast). The average annual cost per vessel is approximately \$1,000. Approximately six of those vessels receive some protection behind the breakwater. Thus, the vessels times the \$1,000 repair cost equals \$16,000 loss to fishermen each year as a result of storm damage and lack of adequate protection. There are lobster boats and other vessels in the area, but it has been difficult to obtain estimates of damage to them.

3. Decrease in Storm Damage - Loss of Jobs

The storm damage and loss of property along the waterfront has resulted in the loss of an estimated twenty-five to thirty jobs, plus the income that would ordinarily accrue to the property owners. Within the bounds of the

downtown business district still threatened by storm losses are an additional 150 seasonal jobs, and 40 year-round jobs. It would be difficult to establish the exact number of jobs per year that could be lost from new storms because one fish factory in the area supports 100 jobs whereas some office buildings support only two or three. However, if thirty jobs were lost in the ten years being surveyed, the average annual loss would be three. Using the same figure for future losses, at an average of \$8,000 per year per job, this amounts to a loss of \$24,000 in annual payroll that is unrecoverable, since a new capital investment would have to be made to create facilities to again make those jobs available.

4. Extra Benefits - Fish Landings

Two Canadian vessels land fish in Eastport each day during the winter months for approximately 60 boat/days. Due to winter's adverse weather and crowded conditions at the present pier, they are unable to bring fish to American buyers for approximately 8 days each, or 16 boat/days. They landed 1060 Hogsheads last year at a price of approximately \$60 per hogshead. If a breakwater pier were provided they could utilize the facility for an additional 16 boat/days at an average of 17.7 hogsheads per day at the new average of \$75 per hogshead plus freight of \$10 per hogshead. The extra benefit to local purchasers of fish would be \$24,072 annually plus the profits from the sale of the fish. Most fish landings in Eastport take place at several private docks, such as the Holmes Packing Corporation, the Hearl Corporation, and the Argenta Products Company. There are no unloading facilities at the present public pier. Last year a private company leased space at the public facility for the purpose of pumping fish from boats to other holding facilities. They supplied their own equipment. If a new public pier breakwater were constructed, and arrangements were made for unloading fish at this facility, it is difficult to determine just what share of the total fish landings would occur there. Therefore, it would be difficult to predict with certainty the increase in such landings.

However, the potential facility could provide shelter so that boats could land fish during more of the stormy days that occur. Last year, the season was approximately seven months in length, and the boats were unable to land fish about 8 days, because of storms or bad weather. According to the National Marine Fisheries Service of Gloucester, Massachusetts, the total landings of both shellfish and finfish in 1977 was 19,703,608 pounds at a value of \$957,012. The calculation would be 19,703,608 divided by 210 days equals 93,827 pounds per day, times approximately 5 cents per pound, times 8 days, which equals \$37,531 more dollars that would accrue to fishermen as a result of a new breakwater pier to protect the waterfront area.

OTHER POSSIBLE BENEFITS:

1. Local fishermen and boat builders say that a new breakwater pier

facility would stimulate local fishermen to replace boats and gear at a faster than normal rate. They feel a reasonable figure would be one additional boat per year than is now being built at the cost of approximately \$60,000.

2. There are 126 local pleasure boats used in the Eastport area. Most of them utilize the local boat launching ramp and pier facility. Since there is no mooring space available at the present pier, boat owners have to remove their watercraft after each use.

It is felt that a larger public pier facility would stimulate the construction and/or sale of more pleasure craft in the area because mooring space would become available, and greater storm protection would be afforded. It is estimated that three new boats per year would be constructed and sold at a price of about \$4,000 for a total of \$12,000 annually.

3. Charter boat operators taking fishing parties and sight-seeing tourists around the bay say that the present pier facilities are not practical for the loading and unloading of more passengers per day for additional trips. Nor are they adequate to handle more charter boats. It is estimated that a new pier facility with greater docking space would stimulate construction and operation of three or four additional charter vessels within the next three to four years at an average cost of \$50,000 per boat.

4. The Maine Department of Transportation estimates that by 1980, Maine exports of forest products, food products, and other products will amount to 525,000 tons per year, and they feel that at least half that amount will move overseas via St. John, New Brunswick, Canada. A new breakwater pier at Eastport will enable the city to enter into shipping arrangements for overseas delivery of Maine products and generate new capital investment, new jobs, and new revenues as a result. A consultant hired by the City of Eastport, using the Department of Transportation's calculations and those of others calculated the potential income from freight costs to be \$8,100,000 that now is being paid to shippers outside the state of Maine to transport goods overseas. Anticipated new jobs and payroll which would add to Eastport's economy would be \$1,053,000 annually. Thus, the new breakwater pier would have the potential of pumping an additional \$9,153,000 into Eastport's local economy annually. It is very likely that import/export development will occur and grow at a very rapid rate if facilities are constructed which will support this growth.

5. The city administration has plans to reconstruct a portion of the downtown commercial district, most of which has already suffered from storm damage. A sum of \$10,000 became available from the National Endowment of the Arts and Humanities this summer, to match with local funds of approximately an equal amount, for the purpose of developing plans for the reconstruction of this area. Such plans call for the construction of a waterfront bulkhead, demolition of abandoned buildings, and the creation

of sidewalks and green areas along its length. Architectural and engineering firm estimates indicate the cost to be around \$1,000,000 for the reconstruction. It is unlikely that funds could be raised or spent for this project without adequate protection from a new breakwater pier to prevent waterfront destruction and losses from occurring all over again.

6. The City administration has plans for the construction of Marina facilities at two locations along the waterfront to better accommodate landings from an expanded fishing fleet, and docking and mooring of the local recreational fleet. The city could receive additional revenues from fees from the use of the proposed facilities. The new marinas are estimated to cost \$500,000. New revenues from fees and rentals have not been computed as yet. A new breakwater pier would be needed to protect these proposed new facilities from destruction by storms.

7. The city administration could lease docking space and mooring space at the breakwater pier for fishing boats and recreational boats. Facilities could be provided to flush holding tanks on ocean-going recreational sailboats and power launches. Refueling facilities could also be provided. Approximately one or two sailing vessels now plying the coast, providing recreation for their owners this summer put in at Eastport requesting safe anchorage and flushing and fueling services. Since Eastport is unable to provide these, the vessels traveled on to other ports in the U.S. or Canada where these facilities are available.

Since the construction of the breakwater pier and the exact footage that could become available for lease has not been determined, it would be reasonable to submit an amount earned by another similar town located a few miles down the coast, and owning modest facilities of this nature. The Town of Mt. Desert, or Northeast Harbor, earns \$30,000 annually from rentals and fees from a much smaller facility than is envisioned for Eastport. Thus, it would be reasonable to project earnings of at least \$30,000 annually for this endeavor in this location. It is felt that the potential for such earnings would be as great or greater in Eastport as in Northeast Harbor.

8. The prospect of the Pittston Oil Company utilizing the proposed breakwater pier facility for the unloading of cargoes unrelated to oil production, and for the protection of tugboats was addressed. Pittston officials were interviewed. The company will create or construct deep water sheltered areas within its offloading area for oil tankers. At least four tugboats will be based in Eastport, however, space may be provided at specially constructed facilities near the tanker facilities at Deep Cove. Therefore, there may be no benefits accruing to the city as a result of Pittston's tugs needing fuel, mooring space at the public pier, or protection from storms. No dollar figure has been added to this report for this segment of the study for this reason.

Cargoes that Pittston Company would need for the construction of the \$650-million refinery would probably be shipped through the port of Eastport if unloading facilities were available there. Also, the operation of the plant after construction is complete will require that materials be shipped into Eastport. The income to the City of Eastport could run into the hundreds of thousands of dollars each year through handling of these cargoes at a new breakwater pier. Pittston officials are reluctant to divulge figures relating to these needs, and they are reluctant to divulge whether or not alternative modes of transportation have been worked out for getting the cargoes into the area. Therefore, no revenue figures have been worked out for this segment of the study, until such time as potential benefits can be worked out.

9. The new Washington County Marine Trades Educational Center will benefit by a new breakwater pier in Eastport. The new school will teach all types of fishing with two large vessels, a wooden boat of approximately 36 feet, and a steel trawler measuring about 72 feet. Students will be operating the vessels and fishing gear in and around Passamaquoddy Bay. The proposed new breakwater pier would be used in the training process to teach students proper docking techniques with large vessels and the procedure for unloading cargoes of fish from their vessels to dockside facilities. The school will not have sufficient docking or mooring space at its locale to provide proper protection for its vessels during bad weather. Also it will be difficult to teach proper navigation for getting into the port area from their location. The support that a new breakwater pier facility would provide for the new training programs would be very great, although difficult to measure in terms of dollars. The pier would help make the school a more permanent facility, and would provide students with a much wider variety of experience in the training programs that will help them when the training is done, and they are operating on their own.

The cost of the construction of the new Marine Trades Education Center is about \$1,500,000. Support for its training programs will enhance the justification for this expenditure.

Two other major benefits that will be provided by the breakwater pier are immeasurable in terms of dollars. This proposed facility will provide the base for the revitalization of the whole fishing industry in and around the Eastport area. The pier will become the focal point for new local commercial development, and for the re-development of the whole waterfront area of the city. Construction of the new facility will spur new private capital development, and will support efforts to raise public funds for re-development purposes. Without the pier, proposals for other new construction would have very little chance for success.

SUMMARY OF BENEFITS

The Immediate Benefits to the City of Eastport would be:

1. Annual Decrease in Destruction of Real Estate-----	\$ 610,986
2. Annual Decrease in Loss of Tax Revenues-----	27,494
3. Annual Decrease in Vessel Damages-----	16,000
4. Direct Added Landings of Fish by the Canadians-----	24,072
5. Annual Decrease in Loss of Jobs-----	24,000
6. Overall Annual Increase in Total Fish Landings-----	37,531
Total Direct Annual Benefits-----	<u>\$ 740,083</u>

Other Possible Benefits:

1. New Workboat Construction-----	\$ 60,000
2. New Pleasure Boat Construction-----	12,000
3. New Charter Boat Construction-----	50,000
4. Support of overseas Commercial Trade-----	9,153,000
5. Reconstruction of Downtown Commercial District-----	1,000,000
6. New Marina Facilities Construction-----	500,000
7. Rentals of Docking and Mooring Space-----	30,000
8. Support of Pittston Operations-----	?
9. Support of Marine Trades Educational Center-----	?
Total Possible Annual Benefits-----	<u>\$ 10,805,000</u>

Total Combined Annual Benefits----- \$ 11,545,083